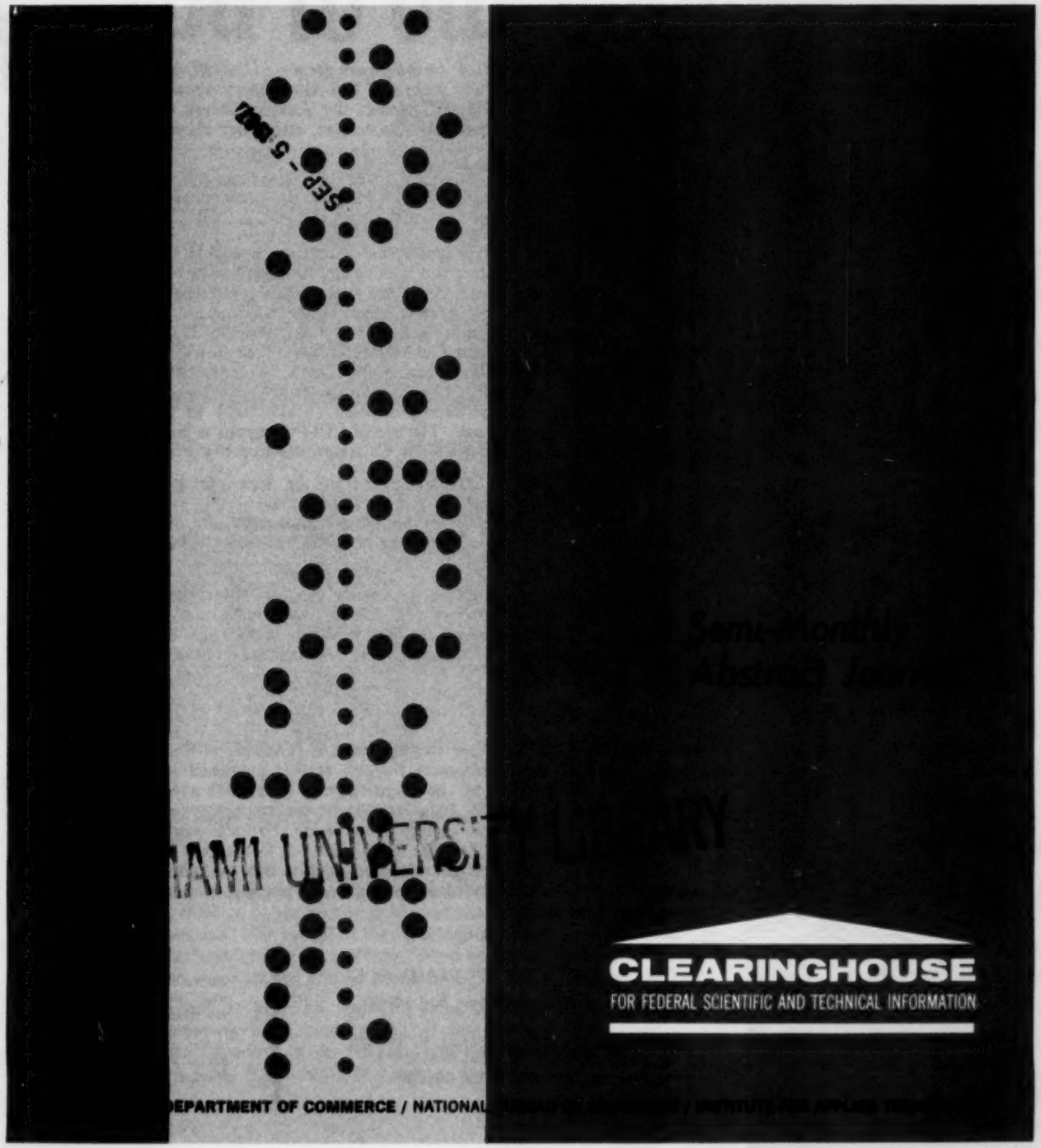
C 41.21 : 67/15

August 10, 1967

U.S. GOVERNMENT

RESEARCH & DEVELOPMENT REPORTS



SEP - 5 1967

MIAMI UNIVERSITY LIBRARY

CLEARINGHOUSE
FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION

DEPARTMENT OF COMMERCE / NATIONAL

U.S. Government **RESEARCH AND DEVELOPMENT REPORTS**

Published semi-monthly by the Clearinghouse for Federal Scientific and Technical Information. Annual subscription $30.00 ($37.50 foreign). Single copy $3.00. Domestic and foreign air mail charges will be quoted on request. Make remittance payable to Clearinghouse and mail either to a U.S. Department of Commerce Field Office or to the Clearinghouse, Springfield, Va., 22151. Address changes should be sent to the Clearinghouse.

PURPOSE

U.S. Government Research & Development Reports (USGRDR) announces the availability of selected new reports of U.S. Government-sponsored R & D released by the Department of Defense, the Atomic Energy Commission, National Aeronautics & Space Administration, and other agencies.

ORDER REPORTS

With few exceptions, reports announced herein are available to the public from the Clearinghouse. The new unit prices for Clearinghouse reports are $3.00 for paper copy (hard copy, HC) and $.65 for microfiche (MF). Order reports by the accession/report number given in the last line of each entry. Order from the Clearinghouse, Springfield, Virginia 22151, or from any Department of Commerce Field Office (listed on the inside back cover). The unit price applies only to copies sold singly. Prepayment is required by check, money order or CFSTI coupon unless purchases are to be charged to a Clearinghouse deposit account. Make check or money order payable to The Clearinghouse. The use of CFSTI coupons is preferred since it simplifies handling and permits the Clearinghouse to provide faster service.

Certain reports, such as those available from the Superintendent of Documents, are priced as shown in the announcements in this journal rather than at the $3.00 price. When reports are announced as available from a source other than the Clearinghouse, order directly from the source indicated.

Coupons for paper copy (HC) documents are available singly for $3.00 each or in Books of 10 coupons for $30.00 Coupons for microfiche copies of Clearinghouse documents are available in Books of 50 coupons for $32.50. Forms for the purchase of Clearinghouse coupons are printed in the back of this journal.

INDEX

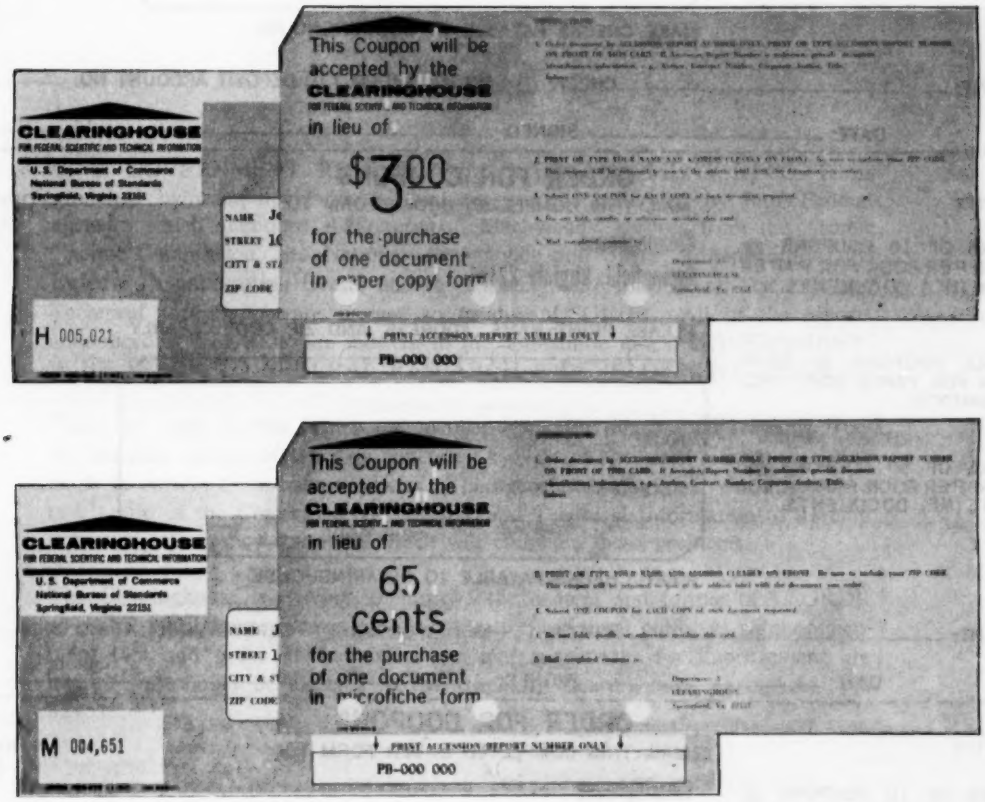
All entries in USGRDR are indexed in the *Government-Wide Index to Federal Research & Development Reports (GWI)* published semi-monthly and sold on subscription by the Clearinghouse at $22.00 a year ($27.50 foreign). Single copy $3.00. Indexing data from current issues of announcement journals of the Atomic Energy Commission, National Aeronautics and Space Administration, and Defense Documentation Center are also included in this index to provide a single reference guide to new unclassified Government-sponsored research and development in the physical sciences, engineering, and related technology.

U.S. DEPARTMENT OF COMMERCE
Alexander B. Trowbridge, Secretary

CLEARINGHOUSE FOR FEDERAL SCIENTIFIC AND TECHNICAL INFORMATION
Hubert E. Sauter, Acting Director

Contents may be printed freely. Mention of source will be appreciated. Use of funds for this publication approved by the Director of the Bureau of Budget, June 22, 1966.

May we introduce you to our coupons?



The Clearinghouse can serve you better if you use them.

Clearinghouse prepaid document coupons are tabulating cards with the face value of the purchase prices of paper copies or microfiche copies of documents. Almost all of the documents in the Clearinghouse collection are now priced at $3.00 each for paper copies and 65 cents in microfiche.

The coupon is your method of payment, order form, shipping label, and receipt of sale. When you order documents on coupons your request moves quickly from our mail room to our warehouse for prompt handling and shipment. Your order is controlled along the way by data processing equipment.

The new Clearinghouse single price/coupon sales system saves you time in another way, too—you do not have to inquire about prices before ordering.

If you haven't placed your first order for Clearinghouse coupons yet, why not use the order form attached.

ORDER FOR COUPONS

QUANTITY

MAIL THIS COMPLETED ORDER FORM TO:

FORM NBS 841
(1-67)

Clearinghouse
Springfield, Virginia 22151

PLEASE PRINT NAME, ADDRESS, AND ZIP CODE CLEARLY

BOOKS OF 10 COUPONS @ $30.00 PER BOOK FOR PAPER COPY (HC) DOCUMENTS.

SINGLE COUPONS @ $3.00 EACH FOR PAPER COPY (HC) DOCUMENTS.

BOOKS OF 50 COUPONS @ $32.50 PER BOOK FOR MICROFICHE (MF) DOCUMENTS.

NAME

ADDRESS

ZIP CODE

MAKE CHECKS PAYABLE TO CLEARINGHOUSE

AMOUNT: _____ CHECK: ☐ MONEY ORDER: ☐ DEPOSIT ACCOUNT NO. _____

DATE: _____ SIGNED: _____

ORDER FOR COUPONS

QUANTITY

MAIL THIS COMPLETED ORDER FORM TO:

FORM NBS 841
(1-67)

Clearinghouse
Springfield, Virginia 22151

PLEASE PRINT NAME, ADDRESS, AND ZIP CODE CLEARLY

BOOKS OF 10 COUPONS @ $30.00 PER BOOK FOR PAPER COPY (HC) DOCUMENTS.

SINGLE COUPONS @ $3.00 EACH FOR PAPER COPY (HC) DOCUMENTS.

BOOKS OF 50 COUPONS @ $32.50 PER BOOK FOR MICROFICHE (MF) DOCUMENTS.

NAME

ADDRESS

ZIP CODE

MAKE CHECKS PAYABLE TO CLEARINGHOUSE

AMOUNT: _____ CHECK: ☐ MONEY ORDER: ☐ DEPOSIT ACCOUNT NO. _____

DATE: _____ SIGNED: _____

ORDER FOR COUPONS

QUANTITY

MAIL THIS COMPLETED ORDER FORM TO:

FORM NBS 841
(1-67)

Clearinghouse
Springfield, Virginia 22151

PLEASE PRINT NAME, ADDRESS, AND ZIP CODE CLEARLY

BOOKS OF 10 COUPONS @ $30.00 PER BOOK FOR PAPER COPY (HC) DOCUMENTS.

SINGLE COUPONS @ $3.00 EACH FOR PAPER COPY (HC) DOCUMENTS.

BOOKS OF 50 COUPONS @ $32.50 PER BOOK FOR MICROFICHE (MF) DOCUMENTS.

NAME

ADDRESS

ZIP CODE

MAKE CHECKS PAYABLE TO CLEARINGHOUSE

AMOUNT: _____ CHECK: ☐ MONEY ORDER: ☐ DEPOSIT ACCOUNT NO. _____

DATE: _____ SIGNED: _____

FOREWORD

U. S. GOVERNMENT RESEARCH AND DEVELOPMENT REPORTS is produced by computer from machineable records generated by four Federal agencies which announce R&D reports. Machineable records from the Atomic Energy Commission, the National Aeronautics and Space Administration, the Defense Documentation Center and the Clearinghouse for Federal Scientific and Technical Information are merged to produce USGRDR. All of the reports announced in USGRDR are indexed in the companion index, GOVERNMENT-WIDE INDEX TO FEDERAL RESEARCH & DEVELOPMENT REPORTS.

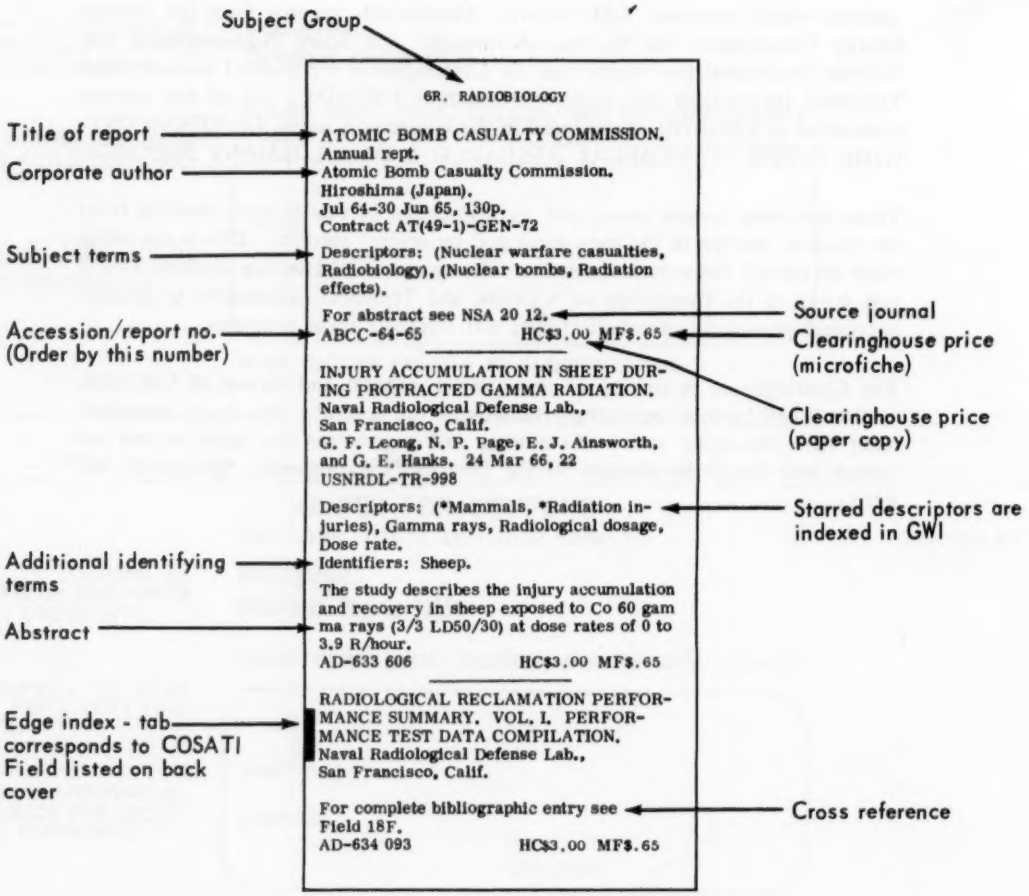
There are some format errors and inconsistencies in this journal resulting from the machine merger of the data generated by several agencies. Efforts are being made to correct these inconsistencies. The agencies involved are working with a task group of the Committee on Scientific and Technical Information to develop improved interagency standards which will eliminate these problems.

The Clearinghouse is striving to improve the content and format of USGRDR so that it will become increasingly valuable to the general public as an announcement tool and order guide. Comments and suggestions for improvement are invited and should be directed to the Director, Clearinghouse, Springfield, Va. 22151.

USGRDR FORMAT

Reports are announced under 22 subject categories called FIELDS. Each FIELD is divided into subcategories called GROUPS. Documents are listed alphanumerically by accession number within the GROUP. This classification system was adopted by the Committee on Scientific and Technical Information (COSATI) of the Federal Council on Science and Technology. The *COSATI Subject Category List* (AD–621 200) is available from the Clearinghouse at $3.00.

SAMPLE JOURNAL ENTRIES


Subject Group
6R. RADIOBIOLOGY
Title of report
ATOMIC BOMB CASUALTY COMMISSION. Annual rept.
Corporate author
Atomic Bomb Casualty Commission. Hiroshima (Japan).
Jul 64-30 Jun 65, 130p.
Contract AT(49-1)-GEN-72
Subject terms
Descriptors: (Nuclear warfare casualties, Radiobiology), (Nuclear bombs, Radiation effects).
For abstract see NSA 20 12.
Source journal
Accession/report no. (Order by this number)
ABCC-64-65 HC$3.00 MF$.65
Clearinghouse price (microfiche)
Clearinghouse price (paper copy)
INJURY ACCUMULATION IN SHEEP DURING PROTRACTED GAMMA RADIATION.
Naval Radiological Defense Lab., San Francisco, Calif.
G. F. Leong, N. P. Page, E. J. Ainsworth, and G. E. Hanks. 24 Mar 66, 22
USNRDL-TR-998
Descriptors: (*Mammals, *Radiation injuries), Gamma rays, Radiological dosage, Dose rate.
Starred descriptors are indexed in GWI
Additional identifying terms
Identifiers: Sheep.
Abstract
The study describes the injury accumulation and recovery in sheep exposed to Co 60 gamma rays (3/3 LD50/30) at dose rates of 0 to 3.9 R/hour.
AD-633 606 HC$3.00 MF$.65
Edge index - tab corresponds to COSATI Field listed on back cover
RADIOLOGICAL RECLAMATION PERFORMANCE SUMMARY. VOL. I. PERFORMANCE TEST DATA COMPILATION.
Naval Radiological Defense Lab., San Francisco, Calif.
For complete bibliographic entry see Field 18F.
Cross reference
AD-634 093 HC$3.00 MF$.65

CONTENTS

Page

RESEARCH HIGHLIGHTS..... v

RESEARCH & DEVELOPMENT REPORTS..... 1

REPORT LOCATOR LIST..... A

SUBJECT CATEGORY HEADINGS

Use Edge Index on back cover to locate COSATI Field in journal

COSATI FIELD

01 AERONAUTICS

Includes aerodynamics; aeronautics; aircraft; aircraft flight control and instrumentation; and air facilities.

02 AGRICULTURE

Includes agricultural chemistry; agricultural economics; agricultural engineering; agronomy and horticulture; animal husbandry; and forestry.

03 ASTRONOMY AND ASTROPHYSICS

Includes astronomy; astrophysics; and celestial mechanics.

04 ATMOSPHERIC SCIENCES

Includes atmospheric physics and meteorology.

05 BEHAVIORAL AND SOCIAL SCIENCES

Includes administration and management; documentation and information technology; economics; history, law and political science; human factors engineering; humanities; linguistics; man-machine relations; personnel selection, training, and evaluation; psychology (individual and group behavior); and sociology.

06 BIOLOGICAL AND MEDICAL SCIENCES

Includes biochemistry; bioengineering; biology; bionics; clinical medicine; environmental biology; escape, rescue, and survival; food; hygiene and sanitation; industrial (occupational) medicine; life support; medical and hospital equipment and supplies; microbiology; personnel selection and maintenance (medical); pharmacology; physiology; protective equipment; radiobiology; stress physiology; toxicology; and weapon effects.

07 CHEMISTRY

Includes chemical engineering; inorganic chemistry; organic chemistry; physical chemistry; and radio and radiation chemistry.

08 EARTH SCIENCES AND OCEANOGRAPHY

Includes biological oceanography; cartography; dynamic oceanography; geochemistry; geodesy; geography; geology and mineralogy; hydrology and limnology; mining engineering; physical oceanography; seismology; snow, ice, and permafrost; soil mechanics; and terrestrial magnetism.

09 ELECTRONICS AND ELECTRICAL ENGINEERING

Includes components; computers; electronic and electrical engineering; information theory; subsystems; and telemetry.

10 ENERGY CONVERSION (Non-Propulsive)

Includes conversion techniques; power sources; and energy storage.

COSATI FIELD

11 MATERIALS

Includes adhesives and seals; ceramics, refractories, and glasses; coatings, colorants, and finishes; composite materials; fibers and textiles; metallurgy and metallography; miscellaneous materials; oils, lubricants, and hydraulic fluids; plastics; rubbers; solvents, cleaners, and abrasives; and wood and paper products.

12 MATHEMATICAL SCIENCES

Includes mathematics and statistics and operations research.

13 MECHANICAL, INDUSTRIAL, CIVIL, AND MARINE ENGINEERING

Includes air conditioning, heating, lighting, and ventilating; civil engineering; construction equipment, materials, and supplies; containers and packaging; couplings, fittings, fasteners, and joints; ground transportation equipment; hydraulic and pneumatic equipment; industrial processes; machinery and tools; marine engineering; pumps, filters, pipes, tubing, fittings, and valves; safety engineering; and structural engineering.

14 METHODS AND EQUIPMENT

Includes cost effectiveness; laboratories, test facilities, and test equipment; recording devices; reliability; and reprography.

15 MILITARY SCIENCES

Includes antisubmarine warfare; chemical, biological, and radiological warfare; defense; intelligence; logistics; nuclear warfare; and operations, strategy, and tactics.

16 MISSILE TECHNOLOGY

Includes missile launching and ground support; missile trajectories; missile warheads and fuzes; and missiles.

17 NAVIGATION, COMMUNICATIONS, DETECTION, AND COUNTERMEASURES

Includes acoustic detection; communications; direction finding; electromagnetic and acoustic countermeasures; infrared and ultraviolet detection; magnetic detection; navigation and guidance; optical detection; radar detection; and seismic detection.

18 NUCLEAR SCIENCE AND TECHNOLOGY

Includes fusion devices (thermonuclear), isotopes; nuclear explosions; nuclear instrumentation; nuclear powerplants; radiation shielding and protection; radioactive wastes and fission products; radioactivity; reactor engineering and operation; reactor materials; reactor physics; reactors (power); reactors (non-power); and SNAP technology.

19 ORDNANCE

Includes ammunition, explosives; bombs; combat vehicles; explosions, ballistics, and armor; fire control and bombing systems; guns; rockets; and underwater ordnance.

20 PHYSICS

Includes acoustics; crystallography; electricity and magnetism; fluid mechanics; masers and lasers; optics; particle accelerators; particle physics; plasma physics; quantum theory; solid-mechanics; solid-state physics; thermodynamics and wave propagation.

21 PROPULSION AND FUELS

Includes air-breathing engines; combustion and ignition.

22 SPACE TECHNOLOGY

Includes astronautics; spacecraft; spacecraft trajectories and reentry; and spacecraft launch vehicles and ground support.

RESEARCH highlights

Reports of current high industrial interest

Highlighted documents, unless otherwise designated, are sold at the new unit price of $3.00 each, 65 cents microfiche.

Categories

	Page
Bonding/Joining	vii
Coatings	viii
Composite Mixed Materials	viii
Earth Sciences and Mineral Industries	viii
Electronic	ix
Food Processing	ix
Mathematics	ix
Metals, Nonferrous and Alloys	x
Optics	x
Power Source Devices	x
Printing, Graphic Arts, Photography	xi
Quality Control Standards, Specifications	xi
Space Technology	xi
Semiconductors and Related Materials	xii
Transportation (Land, Sea, Air, Space)	xii

Bonding/Joining

A VACUUM-BRAZING-GAS QUENCHING technique provides a process for producing helium leak-tight containers with a high level of compatibility, according to a report by scientists at the Martin Company. In a program to develop a joining technique which would control or eliminate the critical oxide contamination usually present, the researchers chose vacuum brazing which eliminates the need for brazing flux, thereby lowering costs and excluding poor joint quality and corrosive damage, and eliminates the need for organic adhesives, which are often unsuitable at cryogenic or moderately high temperatures. The gas quenching process eliminated postcleaning of assemblies, and made possible the use of aluminum or steel tooling instead of the more expensive stainless steel and nickel alloy tooling. The researchers believe that the process can be extended to ferrous and nonferrous alloys. . . . . ORDER AD-649 313 -- VACUUM (OR FLUXLESS) BRAZING-GAS QUENCHING OF 6061 ALUMINUM ALLOY. . . . . M. M. Schwartz, The Martin Co., Baltimore, Md., for the Army, Mar. 67, 41p.

Coatings

A FLAME-QUENCHING UNDERCOAT in combination with a regular coating can be more fire-retardant than modification of paint itself. Scientists of the Naval Research Laboratory, in a program to develop an interior, fire-retardant submarine paint with special performance requirements, have developed an undercoat containing high proportions of chlorinated paraffin and antimony oxide which interact under the influence of the heat to produce the flame-quenching intermediate. The burning characteristics of the paints were evaluated only on noncombustible substrates, and the evaluation limited to water-based paints. However, the researchers believe that the approach to fire retardancy appears to be applicable to any paint system. . . . . ORDER AD-653 062 -- THE INFLUENCE OF A FIRE-RETARDANT UNDERCOAT ON THE BURNING CHARACTERISTICS OF A COMBUSTIBLE TOPCOAT. . . . . T. R. Walton, Naval Research Lab. (NRL Rpt. 6548), Washington, D. C., May 67, 22p.

Composite, Mixed Materials

STRESS-UNIT-SHORTENING CURVE FOR GLASS-FILAMENT-REINFORCED PLASTIC PLATES in the post-buckling region can be predicted by conventional theory for metallic plates. In experiments conducted by researchers of NASA's Langley Research Center, 15 plastic plates of laminated isotropic construction containing either 12 or 18 laminae were tested for Young's modulus, buckling stress, and maximum strength. Delamination occurred at loads below the theoretical compressive strength predicted by an effective width formula that is often used to predict the maximum strength of metal plates. On the basis of strength and modulus data obtained, the researchers show that the glass-epoxy composite is competitive as a lightweight material with aluminum in applications where plate buckling strength or crushing strength is the design criterion. . . . . ORDER N67-23297 -- COMPRESSIVE BEHAVIOR OF PLATES FABRICATED FROM GLASS FILAMENTS AND EPOXY RESIN. . . . . J. G. Davis, Jr., and G. W. Zender, Langley Research Center, NASA, Langley Sta., Hampton, Va., Apr. 67, 34p.

Earth Sciences and Mineral Industries

THE RESULTS OF A SEVEN-YEAR STUDY OF THE STRUCTURAL AND MECHANICAL PROPERTIES OF SEA ICE are available in a report prepared at the Geophysical Institute of the University of Alaska. The experimental work was based upon approximately 3800 stress-strain tests in both direct compression ar direct tension. Temperature, salinity, loading rate, crystal size, crystallographic orientation, ice history, and depth of the ice sheet were all found to significantly affect the strength of the ice. Additional work accomplished in conjunction with the construction of large offshore drilling platforms provided information concerning oscillatory failure of sea ice in compression and strength reduction at very high load rates. It was found that failing sea ice may cause forced resonant vibration in structures, and that the forces are large enough to resonantly vibrate structures weighing several thousand tons. To obtain a copy of this report, order AD-653 883 -- SEA ICE STRENGTH, H. R. Peyton, Univ. of Alaska, College, Alaska, for the Navy, Dec. 66, 271p.

Electronic

THE DEVELOPMENT OF BATCH-PROCESSING TECHNIQUES FOR PASSIVATING AND TERMINATING SILICON INTEGRATED CIRCUITS has been released in a report of work performed for the U. S. Army. The purpose of this program was to develop circuits that could be direct-mounted and interconnected with several other circuits on a single substrate. A general process was established for glass coating silicon integrated circuit chips and attaching them in batches to an appropriately processed substrate. The techniques were demonstrated by the delivery of four 10-chip arrays of glassed silicon microcircuits flip-chip assembled on a plug-in printed circuit board. The report also provides information on wafer glassing and the other processes involved in flip-chip assembly as well as the results of a test sequence demonstrating the effectiveness of the process. To obtain a copy of this report order AD-652 699 -- LOW COST INTEGRATED CIRCUIT TECHNIQUES, S. Wagner and W. Doelp, Philco-Ford Corp., Lansdale, Pa., for the Army, May 67, 101p.

Food Processing

THE SOFT SHELL CLAM INDUSTRY requires an advanced technology to maintain a competitive and progressive existence. In a study to highlight the areas in which this technology can best assist the industry, the Natural Resources Institute of the University of Maryland discusses present and projected practices in harvesting, plant operation, quantitative determinations of foreign materials, standards of quality, storage and preservation, and by-products. Preservation is increasingly important in marketing aspects, especially in view of the highly perishable nature of the product. Pasteurization treatment of the soft shell clams extends the refrigerated shelf life to 60-100 days, and leaves the product with good appearance, flavor, texture, and versatility in preparation. Freezing preservation is gaining in popularity, particularly as a breaded "heat and serve" product. Quality control of the clams as well as the breading-batter and the frying oil is a necessity. . . . . ORDER PB-174 665 -- TECHNOLOGICAL DEVELOPMENT OF THE SOFT SHELL CLAM INDUSTRY. . . . . M. C. Tatro et al., Univ. of Maryland, College Park, for the Economic Development Admin., May 67, 86p.

Mathematics

AN EXPERIMENTAL LANGUAGE, known as FLAP language, is written in LISP 1.5 for the IBM 7090 computer. FLAP language allows the analyst to handle symbolic mathematical data in a variety of ways and to transfer differential equations, manipulate vectors and matrices, etc. A guide to the capabilities and operations of this language may be obtained from the Clearinghouse by ordering AD-647 549 -- THE FLAP LANGUAGE-A PROGRAMMER'S GUIDE. . . . . A. H. Morris, Jr., Naval Weapons Lab., Dahlgren, Va., Jan. 67, 54p.

Metals, Nonferrous and Alloys

THE DEVELOPMENT OF A PROCESS FOR THE FABRICATION OF HIGH-STRENGTH, HIGH-QUALITY PRODUCTS FROM PREALLOYED ATOMIZED ALUMINUM POWDERS is described in Section II of a 3-part final report of work conducted by Alcoa from 1961 to 1965. Atomized aluminum-base alloy powders were usually cold compacted to 74-86% density, preheated at 850-1050°F in an argon atmosphere for at least 12 hours, hot pressed to 100% density at 93,200 psi, and extruded. Strength levels greater than 100,000 psi were consistantly possible with certain alloys, and the properties were maintained over the length of the extrusion. . . . . ORDER AD-479 783 -- DEVELOPMENT OF ALUMINUM-BASE ALLOYS - Section II. . . . . A. P. Haarr, Alcoa, for the Army, Sept. 65, 105p. (Sections I and III of this final report will be announced when they become available.)

Optics

EXPLODING-WIRE PHENOMENA have been found to have many new and useful optical applications. Presented in a report of investigations conducted at Temple University during the past four and one-half years are several aspects of exploding-wire phenomena, including: framing camera and Kerr-cell studies of explosions at reduced pressures, the shunting effect of copper vapor at reduced pressures, and energy considerations in the initial prevaporization stages of the explosion. An induction-free system for measuring the instantaneous voltage across an exploding-wire and air-gap switch was developed, as was an electric 3-color optical pyrometer capable of making surface-temperature measurements with a resolving time in the order of 0.1 microseconds. To obtain a copy of this report, order AD-652 237 -- STUDY OF HIGH ENERGY, HIGH DENSITY DISCHARGES AND HIGH TEMPERATURE MEASUREMENTS AS APPLIED TO EXPLODING WIRES, T. Korneff, Temple Univ., Philadelphia, Pa., for the Air Force, May 67, 30p.

Power Source Devices

THE DEVELOPMENT OF LOW-COST MAGNESIUM/MAGNESIUM PERCHLORATE BATTERIES for field radio applications has been released in a report of investigations conducted for the U. S. Army. The first part of the report describes the development of the battery and examines both the production techniques and materials required for their manufacture. The second part of the report presents the results of a comprehensive testing program designed to measure the performance characteristics of the system under various environmental conditions. To obtain a copy of this report, order AD-649 572 -- INVESTIGATIONS LEADING TO THE DESIGN AND DEVELOPMENT OF MAGNESIUM/MAGNESIUM PERCHLORATE BATTERIES, E. B. Cupp and E. P. Broglio, Eagle-Picher Industries, Inc., Joplin, Mo., for the Army, Feb. 67, 85p.

Printing, Graphic Arts, Photography

IMPROVED LASER LIGHT SOURCES can increase printing speeds and quality of performance of printers now used in photographic printing processes. Tests conducted by scientists of Technical Operations, Inc., demonstrated the feasibility of using a continuous-strip printer and an argon ion laser. The researchers developed a technique using a cylindrical glass rod both as a pressure roller and as an optical element, permitting good line contact and eliminating interference patterns. Results exceeded conventional resolution limits of two commonly-used films. Printing speeds of 5-40 ft/min were achieved, although the researchers believe that developments in lasers since the tests could result in speeds up to 100 ft/min, dependent upon density of input material. The solid cylinder, final optical element appeared to be a successful design solution to the combined contact/band spread problem, maintaining sufficient optical contact during exposure to eliminate interference patterns and to keep the input light nearly collimated to reduce image undercutting. . . . . ORDER AD-651 925 -- CONTACT PRINTING WITH COHERENT LIGHT. . . . . E. L. Bouche and D. A. Servaes, Technical Operations, Inc., for the Air Force (RADC-TR-66-473), Mar. 67, 83p.

Quality Control Standards, Specifications

THE DEVELOPMENT OF METHODS FOR SYNCHRONIZING REMOTELY LOCATED CLOCKS is currently the goal of a large number of investigators. The choice of a practical system of clock synchronization is determined by the particular requirements of three basic considerations: (1) the synchronization accuracy desired, (2) the size of the area within which synchronization is to be implemented, and (3) the relative accessibility of the remote clocks to the receipt of synchronizing data within their area. Analysis of these factors shows that with increased accuracy requirements there is a proportionate increase in cost due to greater system complexity, operational costs, and synchronization logistics. Information includes the synchronization of remotely located clocks, and a survey of existing systems and descriptions of recommended methods. . . . . ORDER N67-19896 -- STUDY OF METHODS FOR SYNCHRONIZING REMOTELY-LOCATED CLOCKS. . . . . Sperry Gyroscope Co., Great Neck, N. Y., for Goddard Space Flight Center, Mar. 67, 211p.

Space Technology

STRESS UPON SMALLER INSTRUMENTATION PACKAGES AND REDUCTION OF POWER REQUIREMENTS are persistent problems for persons conducting research in the upper atmosphere and outer space. In a report prepared at Northeastern University, these problems of instrumentation, as they occur is rocket probes of the earth's atmosphere, orbiting vehicles, and deep-space probe vehicles, are examined in terms of environmental difficulties (including vacuum of space, radiation and particle bombardment, and temperature effects) and vehicular difficulties (including shock and vibration, size and weight, power limitations, and communication). To receive a copy of this report order AD-651 649 -- PROBLEMS OF INSTRUMENTATION IN SPACE RESEARCH, B. L. Cochrun and L. J. Nardone, Northeastern Univ., Boston, Mass., for the Air Force, Dec. 66, 16p.

Semiconductors and Related Materials

ION IMPLANTATION OF HIGH ENERGY DOPANT IONS into semiconductors for the formation of controlled doped layers is described in a final report of investigations conducted for the Air Force. The possibility of using ion implantation as a process for active devices in both Group IV and III-V semiconductors is explored. B and P ions are used exclusively for p- and n-type layers in Si, SiC, and diamond; and Zn and S ions are used for p- and n-type layers in GaAs. The emphasis of the report is on device work, and, in particular, on the demonstration of transistor action in both npn and pnp transistors, n-channel junction FETs, and GaAs and SiC diodes. . . . . ORDER AD-651 313 -- HIGH ENERGY ION IMPLANTATION OF MATERIALS. . . . . F. A. Leith et al., Ion Physics Corp., Burlington, Mass., for the Air Force, Jan. 67, 54p.

Transportation (Land, Sea, Air, Space)

A UNIQUE RAPID-TRANSIT SYSTEM, the Transit Expressway, has been constructed in a full-scale test facility in South Park, Allegheny County, Pennsylvania. The vehicle is operated by electricity and runs on four pairs of pneumatic tires. The roadway, which is 9,360 feet long, has tracks made of concrete ribbons 22 inches wide; a steel "I" beam is mounted between the tracks and is used by the vehicle's guide wheels to steer each axle and to position and lock the vehicle on the roadway. Based on the use of compact, minimum-weight vehicles operating singly or in trains, the system provides computer-controlled 24-hour service, with a train passing a given point as frequently as every 120 seconds. The system is designed to fit the needs of medium population density metropolitan areas in urban service. . . . . ORDER PB-174 757 -- TRANSIT EXPRESSWAY REPORT. . . . . MPC Corp., Pittsburgh, Pa., for the Dept. of Housing and Urban Development, Feb. 67, 291p.

RESEARCH & DEVELOPMENT REPORTS

1. AERONAUTICS

1A. AERODYNAMICS

EXPERIMENTAL INVESTIGATION OF THE IMPACT PROBE METHOD FOR DETERMINING LOCAL SKIN FRICTION IN THE PRESENCE OF AN ADVERSE PRESSURE GRADIENT FOR A RANGE OF MACH NUMBERS FROM 1.70 TO 2.75.
Technical rept.,
Texas Univ., Austin. Defense Research Lab.
Oliver Hill. Jan 63, 112p DRL-498
Contract NOrd-16498
Prepared in cooperation with Johns Hopkins Univ., Silver Spring, Md. Applied Physics Lab., CF-3010.

Descriptors: (*Skin friction, Test methods), (*Pitot tubes, Friction), Shear stresses, Pressure, Supersonic flow, Turbulent boundary layer, Flat plate models, Wind tunnel models, Model tests, Drag, Adiabatic gas flow, Compressible flow, Theory, Mathematical analysis, Equations, Measurement, Errors, Experimental data, Tables, Graphics, Feasibility studies, Surface properties.
Identifiers: Mixing length, Law of the wall, Velocity defect law.

The results are presented of an experimental program to determine the feasibility of using a surface impact probe to measure values of local skin friction in a turbulent boundary layer over a range of Mach Numbers and pressure gradients. The work is an extension of previous work on adverse pressure gradients which was done at a nominal Mach Number of 2.0. The present investigation was conducted on an adiabatic flat surface which formed the test-section floor of a variable Mach Number supersonic wind tunnel. The Mach Numbers ranged from 1.70 to 2.75 with adverse pressure gradients of zero to 1.57 psi/in. (Author)
AD-457 591 HC$3.00

ON TWO THEORIES OF PLANE POTENTIAL FLOWS WITH FINITE GRAVITIES.
Naval Ordnance Lab., White Oak, Md.
For primary bibliographic entry see Field 20D.
AD-492 093 HC$3.00

FREE-FLIGHT MEASUREMENT OF LOCAL TURBULENT SKIN FRICTION ON AN RM-10 VEHICLE.
Texas Univ Austin Defense Research Lab
For primary bibliographic entry see Field 20D.
AD-652 801 HC$3.00 MF$0.65

A PRELIMINARY STUDY OF CURVED BOW SHOCK FRONTS.
Texas Univ Austin Defense Research Lab
For primary bibliographic entry see Field 20D.
AD-652 805 HC$3.00 MF$0.65

HEAT TRANSFER AND EQUILIBRIUM TEMPERATURE OF A SPHERE IN A SUPERSONIC FLOW OF RAREFIED GAS.
Johns Hopkins Univ Silver Spring Md Applied Physics Lab
For primary bibliographic entry see Field 20D.
AD-652 820 HC$3.00 MF$0.65

EXPERIMENTAL INVESTIGATION OF JET-SIMULATED FLARE STABILITY OF AN OGIVE-CYLINDER AT SUPERSONIC SPEEDS.
Michigan Univ Ann Arbor Dept of Aeronautical and Astronautical Engineering
For primary bibliographic entry see Field 20D.
AD-652 824 HC$3.00 MF$0.65

ANGULAR DISTRIBUTION OF FLOW FROM ORIFICES AND TUBES AT HIGH KNUDSEN NUMBERS,
Massachusetts Inst of Tech Cambridge Research Lab of Electronics
For primary bibliographic entry see Field 20D.
AD-652 905 Not available from CFSTI.

CHARACTERISTICS OF SEPARATED CYLINDRICAL BOUNDARY LAYERS,
Advisory Group for Aeronautical Research and Development Paris (France)
For primary bibliographic entry see Field 20D.
AD-652 920 HC$3.00 MF$0.65

SURFACE WARP AND AERODYNAMIC HEATING,
Advisory Group for Aeronautical Research and Development Paris (France)
W. B. Huston. Oct 60, 29p Rept no. AGARD-312
N62-15913
NATO Furnished.

Descriptors: (*Aircraft, Aerodynamic heating), (*Aerodynamic heating, Deformation), Surfaces, Wings, Airframes, Aeroelasticity, Aerodynamic loading, Supersonic planes, Lifting reentry vehicles.
Identifiers: Warp.

The high speeds of present-day aircraft, and the much higher speeds of projected supersonic transports and lifting re-entry vehicles, have added a new dimension, viz. temperature, to an old problem of aircraft design, the interaction between aerodynamic forces and elastic structures. The paper constitutes a brief review of the state of the art of relating temperatures, structural deformations, and aerodynamic loads. The review considers first some representative structural problems, and then the interrelation between structural deformation and aerodynamic loads. (Author)
AD-652 925 HC$3.00 MF$0.65

EXEMPLES D'ESSAIS AERODYNAMIQUES PRIS HORS DE L'AERONAUTIQUE CLASSIQUE (Examples of Aerodynamic Tests Differing from Standard Aeronautical Tests),
Advisory Group for Aeronautical Research and Development Paris (France)
For primary bibliographic entry see Field 20D.
AD-652 995 HC$3.00 MF$0.65

APPLICATION DU CALCULATEUR ANALOGIQUE A L'ETUDE DU COUPLAGE DES MOUVEMENTS LONGITUDINAUX ET TRANSVERSAUX D'UN AVION (Application of an Analog Computer to the Study of the Coupling of an Airplane's Longitudinal and Transverse Movements),
Advisory Group for Aeronautical Research and Development Paris (France)
F. C. Haus. Apr 61, 87p Rept no. AGARD-354
N62-15480
NATO Furnished. Text in French; discussion and addendum in English.

Descriptors: (*Airplanes, Motion), Pitch (Motion), Analog computers, Belgium, Stability.

Contents: Mise en equations; Solution du systeme d'equations; Examen des diagrammes releves; Critere de stabilite et conclusions.
AD-652 996 HC$3.00 MF$0.65

METHODES UTILISEES POUR LA MISE AU POINT DE L'AVION BREGUET 940 A AILES SOUFFLEES (Methods Used for the Final Design Analysis of the Breguet 940 'Blower-Wing' Plane),
Advisory Group for Aeronautical Research and Development Paris (France)
For primary bibliographic entry see Field 1C.
AD-652 998 HC$3.00 MF$0.65

INERTIAL RANGES IN TWO-DIMENSIONAL TURBULENCE.
Kraichnan (Robert H) Peterborough N H
For primary bibliographic entry see Field 20D.
AD-653 111 HC$3.00 MF$0.65

INITIAL AND BOUNDARY VALUE PROBLEMS IN DISSIPATIVE GAS DYNAMICS,
Brown Univ Providence R I Div of Applied Mathematics
For primary bibliographic entry see Field 20D.
AD-653 121 Not available from CFSTI.

THE BLOWHARD PROBLEM--INVISCID FLOWS WITH SURFACE INJECTION,
Rand Corp Santa Monica Calif
For primary bibliographic entry see Field 20D.
AD-653 146 HC$3.00 MF$0.65

CONDENSATION DROPLET GROWTH IN RAREFIED GASES,
Cornell Aeronautical Lab Inc Buffalo N Y
For primary bibliographic entry see Field 20D.
AD-653 199 HC$3.00 MF$0.65

FINITE DIFFERENCE SOLUTION OF THE LAMINAR COMPRESSIBLE BOUNDARY LAYER EQUATIONS IN THE VON MISES VARIABLES WITH APPLICATIONS,
New York Univ N Y Dept of Aeronautics and Astronautics
For primary bibliographic entry see Field 20D.
AD-653 206 HC$3.00 MF$0.65

COMPUTATIONAL AND EXPERIMENTAL STUDY OF A CAPTIVE ANNULAR EDDY,
Iowa Univ Iowa City Inst of Hydraulic Research
For primary bibliographic entry see Field 20D.
AD-653 220 Not available from CFSTI.

KINETIC MODELS FOR A GAS WITH INTERNAL STRUCTURE,
Brown Univ Providence R I Div of Engineering
For primary bibliographic entry see Field 20D.
AD-653 296 Not available from CFSTI.

EXPANSION OF UNIFORM GAS CLOUDS INTO A VACUUM.
Cornell Univ Ithaca N Y
For primary bibliographic entry see Field 20D.
AD-653 325 Not available from CFSTI.

DRAG OF AN OBJECT IN NEARLY-FREE MOLECULAR FLOW.
New York Univ N Y Courant Inst of Mathematical Sciences
For primary bibliographic entry see Field 20D.
AD-653 384 Not available from CFSTI.

FLIGHT EVALUATION OF SPLITTER-PLATE EFFECTIVENESS IN REDUCING BASE DRAG AT MACH NUMBERS FROM 0.65 TO 0.90.
National Aeronautics and Space Administration. Flight Research Center, Edwards, Calif.
J. Hintz, and E. J. Saltzman. May 67, 23p NASA-TM-X-1376
Contract 126-16-05-02-24

Descriptors: *Drag reduction, *Flight test, *Plate, *Subsonic speed, Aircraft, Base, Blunt, Coefficient, Drag, Edge, F-104 aircraft, Flight, Hypersonic, Pressure, Reduction, Reentry, Reynolds number, Speed, Splitting, Subsonic, Test, Trailing, Vehicle.

For abstract, see STAR 05 14.
N67-26558 HC$3.00 MF$0.65

ANALYTICAL STUDY OF SPIN.
Etude Analytique de La Vrille
National Aeronautics and Space Administration, Washington, D. C.
M. O. Aguesse, and M. Scherer. May 67. 12p NASA-TT-F-10902, ONERA-TP-388
Transl. Into English From French Presented At the Agard Meeting on Stability and Control, Cambridge, Gt. Brit., 20-23 Sep. 1966

Descriptors: *Aircraft model, *Delta wing, *Spin test, Aircraft, Back, Calculation, Conference, Delta, Model, Spin, Sweep, Test, Tunnel, Wind, Wing.

For abstract, see STAR 05 14.
N67-26637 HC$3.00 MF$0.65

CALCULATION OF THE AERODYNAMIC CAPACITIES OF THE DVL SUPERSONIC WIND TUNNELS AT PORZ- WAHN.
Berechnung Der Aerodynamischen Leistungen Der Uberschallwindkanale Der Dvl in Porz-Wahn
Deutsche Versuchsanrtalt Fur Luft- Und Raumfahrt, Porz (West Germany). Institut Fur Angewandte Gasdynamik.
W. Neuberger, and G. Schulz. Feb 67. 88p DLR-FB-67-14, DVL-597
in German, English Summary

Descriptors: *Aerodynamics, *Supersonic wind tunnel, Air, Calculation, Capacity, Equation, Jet, easurement, Storage, Supersonic, Supply, Tank, Tunnel, Vacuum, Wind.

For abstract, see STAR 05 14.
N67-27196 HC$3.00 MF$0.65

MEASUREMENTS ON SLOTTED SUPERSONIC FLOW.
Messungen An Geschlitzten Spoilern Im Ueberschallberetch
Deutsche Versuchsanstalt Fur Luft- Und Raumfahrt, Porz (West Germany). Institut Fuer Angewandte Gasdynamik.
E. Stanewsky. Feb 67. 86p DLR-FB 67-08, DVL-590
in German, English Summary

Descriptors: *Aerodynamic characteristics, *Spoiler-slot aileron, *Supersonic flow, Aerodynamic, Aileron, Boundary, Characteristics, Distribution, Drag, Flat, Flow, Layer, Lift, Plate, Pressure, Ratio, Separation, Slot, Spoiler, Supersonic.

For abstract, see STAR 05 14.
N67-27199 HC$3.00 MF$0.65

INVESTIGATION OF A SUBMERGED NOZZLE ON A 1/14.2-SCALE MODEL OF THE 260-INCH SOLID ROCKET.
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
For primary bibliographic entry see Field 21H.
For abstract, see STAR 05 14.
N67-27265 HC$3.00 MF$0.65

THE USE OF SELF-CALIBRATING CATALYTIC PROBES TO MEASURE FREE-STREAM ATOM CONCENTRATION IN A HYPERSONIC FLOW.
Toronto Univ. (Ontario).
N. M. Reddy. May 67. 92p NASA-CR-780
Grant NSG-633

Descriptors: *Atom concentration, *Catalytic activity, *Hypersonic flow, Activity, Atom, Calibration, Catalysis, Concentration, Dissociation, Efficiency, Flow, Fluid, Gas, Heat, Hypersonic, Measurement, Mechanics, Probe, Stagnation, Stream, Technique, Transfer.

For abstract, see STAR 05 14.
N67-27268 HC$3.00 MF$0.65

LONGITUDINAL AERODYNAMIC CHARACTERISTICS AT MACH NUMBERS FROM 0.50 TO 1.19 OF A SUPERSONIC TRANSPORT MODEL WITH A MODIFIED M WING.
National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
E. J. Ray, and R. T. Taylor. Jun 67. 75p NASA-TM-X-1386
Contract 720-01-00-03-23

Descriptors: *Aerodynamic characteristics, *Aircraft model, *M wing, *Supersonic transport, Configuration, Drag, Horizontal, Lift, Longitudinal, Mach number, Ratio, Scat, Stability, Tail.

For abstract, see STAR 05 14.
N67-27300 HC$3.00 MF$0.65

FUNDAMENTAL STUDY IN LOW DENSITY GAS DYNAMICS SEMIANNUAL PROGRESS REPORT, NOV. 1, 1966 - MAY 1, 1967.
Tennessee Univ., Knoxville. Dept. of Mechanical and Aerospace Engineering.
P. W. Cowling, M. W. Milligan, and H. J. Wilkerson. 5 May 67. 27p NASA-CR-84410, AE-67-023-2
Contract NGR-43-001-023

Descriptors: *Annular flow, *Rarefied gas dynamics, Annulus, Dynamics, Experiment, Facility, Flow, Gas, Internal, Low density, Model, Rarefaction, Theory.

For abstract, see STAR 05 14.
N67-27369 HC$3.00 MF$0.65

A QUASI-THREE-DIMENSIONAL METHOD FOR CALCULATING BLADE SURFACE VELOCITIES FOR AN AXIAL FLOW TURBINE BLADE.
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
L. T. Dellner, and T. Katsanis. Jun 67. 36p NASA-TM-X-1394
Contract 720-03-01-35-33

Descriptors: *Three-dimensional flow, *Turbine blade, *Velocity distribution, Aerodynamics, Analysis, Blade, Compressible, Computer, Design, Dimensional, Distribution, Flow, Fortran, Program, Radial, Rotor, Three, Turbine, Variable, Velocity.

For abstract, see STAR 05 14.
N67-27572 HC$3.00 MF$0.65

ADDITIONAL STUDY AND FURTHER DEVELOPMENT OF THE TRACER-SPARK TECHNIQUE FOR FLOW-VELOCITY MEASUREMENTS. A STUDY OF THE STRUCTURE OF SPARK COLUMNS FOR VELOCITY MEASUREMENT IN A HYPERSONIC STREAM.
Stanford Univ., Calif. Dept. of Aeronautics and Astronautics.
J. B. Kyser. May 67. 167p NASA-CR-760
Grant NSG-620

Descriptors: *Hypersonic flow, *Spark, *Tracer, Current, Energy, Field, Flow, Hypersonic, Intensity, Magnetic, Measurement, Phase, Profile, Stream, Temperature, Time, Velocity.

For abstract, see STAR 05 14.
N67-27573 HC$3.00 MF$0.65

MEASURED AND COMPUTED STATIC AERODYNAMIC CHARACTERISTICS OF ABLATING CONICAL TEFLON MODELS AT MACH NUMBER 14.
National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
J. R. Hagen, and L. H. Jorgensen. Jun 67. 34p NASA-TN-D-4022
Contract 124-07-02-23-00-21

Descriptors: *Ablating material, *Aerodynamic force, *Hypersonic speed, *Pitching moment, *Teflon, Ablation, Aerodynamic, Angle, Boattail, Coefficient, Cone, Flow, Force, Free, Half, Hypersonic, Laminar, Loss, Mach number, Mass, Material, Model, Moment, Pitch, Pressure, Speed, Static, Stream.

For abstract, see STAR 05 14.
N67-27616 HC$3.00 MF$0.65

THEORETICAL STUDIES OF SOME NON-LINEAR ASPECTS OF HYPERSONIC PANEL FLUTTER STATUS REPORT, 1 SEP. 1966 - 28 FEB. 1967.
Stanford Univ., Calif.
K. Karamcheti. Feb 67. 7p NASA-CR-84515, REPT.-3
Contract NGR-05-020-102

Descriptors: *Hypersonic force, *Nonlinearity, *Panel flutter, Aerodynamic, Differential, Effect, Equation, Flutter, Force, Galerkin method, Hypersonic, Load, Nonconservative, Panel, Principle, Solution, System, Variation.

For abstract, see STAR 05 14.
N67-27673 HC$3.00 MF$0.65

PROGRAM TO MEASURE THE MACROSCALE TURBULENCE OF SUBSONIC JETS.
Wyle Labs., Inc., Huntsville, Ala.
E. B. Miller. Nov 66. 73p NASA-CR-84423, WR-66-46
Contract NAS8-11312

Descriptors: *Air jet, *Jet mixing, *Shear flow, *Subsonic flow, *Turbulent flow, Air, Analog, Anemometer, Cold, Converter, Data, Digital, Flow, Jet, Mixing, Program, Shear, Subsonic, Turbulent, Velocity.

For abstract, see STAR 05 14.
N67-27702 HC$3.00 MF$0.65

BOTH ENDS OF THE STICK.
Israel Inst. of Tech., Haifa.
B. S. Shenstone. 1967. 20p
Presented At the 9th Israel Ann. Conf. on Aviation and Astronautics, Tel-aviv, 22 Feb. 1967, Sponsored By Israel Airlines, Ltd.

Descriptors: *Aircraft performance, *Jet aircraft, *Supersonic aircraft, *Wing stall, Aerodynamic, Air, Aircraft, Design, Flutter, Jet, Operation, Performance, Pitch, Problem, Propeller, Roll, Speed, Spin, Stall, Subsonic, Supersonic, Turbulence, Wing.

For abstract, see STAR 05 14.
N67-27770 HC$3.00 MF$0.65

AERODYNAMIC DRAG ON VEHICLES IN ENCLOSED GUIDEWAYS.
Massachusetts Inst. of Tech., Cambridge. Engineering Projects Lab.
For primary bibliographic entry see Field 13F.
PB-173 646 HC$3.00 MF$0.65

1B. AERONAUTICS

FLIGHT OBSERVATIONS OF ATMOSPHERIC TURBULENCE.
Eastern Air Lines, Inc., Miami, Fla. Meteorology Dept.
For primary bibliographic entry see Field 4B.
AD-643 554 HC$3.00 MF$0.65

FEASIBILITY STUDY OF TURBINE FUEL GELS FOR REDUCTION OF CRASH FIRE HAZARDS.
Western Co of North America Dallas Tex Research Div
For primary bibliographic entry see Field 21D.
AD-652 918 HC$3.00 MF$0.65

DESIGN STUDY REPORT. EXPERIMENTAL EVALUATION OF PWI/CAS INTERROGATOR-TRANSPONDER TECHNIQUES. VOLUME I,
Sperry Gyroscope Co Great Neck N Y
C. S. McKown, J. J. Morrone, D. P. Blowney, and D. J. McNamara. Dec 62, 285p Rept no. CA-4283-0157-1
Contract FAA/ARDS-444
See also AD-652 944.

Descriptors: (*Transponders, *Aircraft equipment), (*Safety devices, Aircraft equipment), Microwave equipment, Radar beacons, Design, Sensors, Coding, Decoding, Analysis.
Identifiers: PWI/CAS Interrogator-Transponder techniques.

The design study is the first task of an overall program to evaluate the feasibility of compatible Pilot Warning Indicator/Collision Avoidance System (PWI/CAS) interrogator-transponder techniques. The techniques are cooperative and provide both PWI and CAS levels of airborne collision prevention capability - compatible in terms of transmitted signals. The PWI level provides a display of the relative position of a nearby intruder for the pilot's evaluation. The CAS level incorporates the logic for threat evaluation, providing an indication of the appropriate evasive maneuver where required. A minimum level can also be provided, consisting of the cooperating element, or transponder, only. Compatibility is achieved by the use of a common cooperating element at all levels, which assures the proper operation of any level in an encounter with any other. The report is divided into two basic parts. The first, which constitutes the main body of the text, contains a general description of the basis and results of the design investigation. The second part, which is a set of appendices, provides supporting detail for the various sections of the first part.
AD-652 943 HC$3.00 MF$0.65

DESIGN STUDY REPORT. EXPERIMENTAL EVALUATION OF PWI/CAS INTERROGATOR-TRANSPONDER TECHNIQUES. VOLUME II,
Sperry Gyroscope Co Great Neck N Y
C. S. McKown, J. J. Morrone, D. P. Blowney, and D. J. McNamara. Dec 62, 128p Rept no. CA-4283-0157-2
Contract FAA/ARDS-444
See also AD-652 943.

Descriptors: (*Transponders, *Aircraft equipment), (*Safety devices, Aircraft equipment), Microwave equipment, Design, Sensors, Coding, Decoding, Analysis, Antennas.
Identifiers: PWI/CAS Interrogator-Transponder techniques.

The design study is the first task of an overall program to evaluate the feasibility of compatible Pilot Warning Indicator/Collision Avoidance System (PWI/CAS) interrogator-transponder techniques. The techniques are cooperative and provide both PWI and CAS levels of airborne collision prevention capability - compatible in terms of transmitted signals. The PWI level provides a display of the relative position of a nearby intruder for the pilot's evaluation. The CAS level incorporates the logic for threat evaluation, providing an indication of the appropriate evasive maneuver where required. A minimum level can also be provided, consisting of the cooperating element, or transponder, only. Compatibility is achieved by the use of a common cooperating element at all levels, which assures the proper operation of any level in an encounter with any other. The report is divided into two basic parts. The first, which constitutes the main body of the text, contains a general description of the basis and results of the design investigation. The second part, which is a set of appendices, provides supporting detail for the various sections of the first part. Appendices A through G are included in Volume I; Appendices H through J (Equipment characteristics; Sensor requirements; Component characteristics) appear in Volume II.
AD-652 944 HC$3.00 MF$0.65

FLIGHT INVESTIGATION OF THE LANDING TASK IN A JET TRAINER WITH RESTRICTED FIELDS OF VIEW.
National Aeronautics and Space Administration. Flight Research Center, Edwards, Calif.
D. C. Bacon, Jr., W. H. Dana, and J. J. Perry. Jun 67, 23p NASA-TN-D-4018
Contract 125-19-06-03-24

Descriptors: *Landing, *Pilot performance, *T-33 aircraft, *View factor, Aircraft, Error, Factor, Field, Jet, Performance, Pilot, Power, View.

For abstract, see STAR 05 14.
N67-27294 HC$3.00 MF$0.65

STOP - A COMPUTER PROGRAM FOR SUPERSONIC TRANSPORT TRAJECTORY OPTIMIZATION.
Boeing Co., Seattle, Wash.
J. W. Frenk, M. L. Matthews, and L. H. Stein. May 67, 335p NASA-CR-793
Contract NAS1-5293

Descriptors: *Flight path, *Ibm 7094 computer, *Steepest ascent method, *Supersonic transport, Altitude, Angle, Ascent, Boom, Computer, Control, Controller, Digital, Flight, Matrix, Method, Optimization, Path, Pitch, Program, Sonic, Step, Supersonic, Sweep, Transport, Variable, Weight, Wing.

For abstract, see STAR 05 14.
N67-27299 HC$3.00 MF$0.65

STATISTICAL ANALYSIS OF LANDING-CONTACT CONDITIONS FOR THE XB-70 AIRPLANE.
National Aeronautics and Space Administration. Flight Research Center, Edwards, Calif.
R. R. Larson, and R. J. Wilson. Jun 67, 29p
NASA-TN-D-4007
Contract 732-01-00-03-24

Descriptors: *Aircraft landing, *Frequency distribution, *Histogram, *Statistical analysis, *Xb-70 aircraft, Aircraft, Analysis, Angle of attack, Contact, Curve, Distribution, Frequency, Landing, Parameterization, Pitch, Probability, Rolling, Sideslip, Statistical, Supersonic, Velocity, Vertical.

For abstract, see STAR 05 14.
N67-27617 HC$3.00 MF$0.65

1C. AIRCRAFT

SURFACE WARP AND AERODYNAMIC HEATING.
Advisory Group for Aeronautical Research and Development Paris (France)
For primary bibliographic entry see Field 1A.
AD-652 925 HC$3.00 MF$0.65

FLIGHT TEST INSTRUMENTATION FOR V/STOL AIRCRAFT,
Advisory Group for Aeronautical Research and Development Paris (France)
G. Bruning. Apr 61, 66p Rept no. AGARD-317
N62-14804
NATO Furnished.

Descriptors: (*Short take-off planes, Flight testing), (*Vertical take-off planes, Flight testing), (*Flight testing, Instrumentation), Optimization, Test methods, Airborne, Recording systems, Test equipment, France.

The flight testing of V/STOL aircraft involves the measurement of certain quantities, some of which are the same as for conventional aircraft. Where the quantities are different, those concerned in the V/STOL field have tackled the new problems in their own way. General aspects are considered, some illustrative examples are given, the physical quantities of interest in V/STOL testing are discussed, and recording methods are described. Finally, an attempt is made to suggest an optimum instrumentation. It is concluded that most of the quantities of interest can be measured by conventional methods, whereas others, such as low horizontal speeds, altitude, and rate of climb and descent, present difficulties. There is an obvious demand for lighter airborne equipment than is available at present. (Author)
AD-652 926 HC$3.00 MF$0.65

SOME NOTES ON UNITED KINGDOM EXPERIENCE IN THE TESTING OF VTOL AIRCRAFT,
Advisory Group for Aeronautical Research and Development Paris (France)
R. T. Shields. Apr 61, 17p Rept no. AGARD-318
N62-14805
NATO Furnished.

Descriptors: (*Vertical take-off planes, Flight testing), Test methods, Great Britain, Instrumentation, Captive tests, Hovering, Flight paths, France.

Experience to date in the flight testing of VTOL aircraft in the United Kingdom is reviewed. Methods employed in the testing of three aircraft, the Rolls-Royce 'Flying Bedstead', Short SC.1., and Hawker P 1127 are considered. Special ground facilities, in particular gantries and perforated platforms, evolved for the testing of these aircraft are briefly described and experience with them is discussed. Instrumentation methods which have been employed are briefly discussed and some special aspects of the flight programmes adopted are noted. It is generally concluded on the basis of this experience that, for the testing of a future similar type of aircraft, a perforated platform with ground tethering would be the primary additional facility needed and that data recording requirements are mainly similar to those for conventional aircraft. (Author)
AD-652 927 HC$3.00 MF$0.65

INVESTIGATION ON THE IMPROVEMENT OF LONGITUDINAL STABILITY OF A JET AIRCRAFT BY THE USE OF A PITCH-DAMPER,
Advisory Group for Aeronautical Research and Development Paris (France)
R. Mautino. Apr 61, 53p Rept no. AGARD-370
N62-15162
NATO Furnished.

Descriptors: (*Jet fighters, Stabilization systems), (*Pitch (Motion), Damping), Stability, Italy, Efficiency, Optimization, Flight testing.
Identifiers: G-91 aircraft.

In view of the possibility of a future installation of a pitch-damper on the (FIAT) G 91 aircraft, a preliminary study with the aid of an analogue computer was carried out on the aeroplane flying qualities for different flight conditions (weight, centre of gravity, altitude, speed) with and without pitch-damper, and also with a failing pitch-damper, in order to evaluate the efficiency and stability of a system of this kind and the influence of the various parameters. Each configuration was repeated for various pitch-damper gain values to determine an optimum value, acceptable for use throughout the aeroplane operational envelope. With the optimum gain value defined, a flight test schedule was

then developed, on the basis of the examination of these results, with the pitch-damper on and off, at different altitudes and Mach numbers, with various gain values and with a disturbance of varying level excited by the pilot deflecting and countermaneuvering the elevator. The results achieved, both in the approximation of the transfer functions and in the simulation of the transients, proved satisfactory and quite suitable for preliminary theoretical evaluation of the efficiency and stability of a servo system involving such complexities. (Author)
AD-652 931 HC$3.00 MF$0.65

APPLICATION DU CALCULATEUR ANALOGIQUE A L'ETUDE DU COUPLAGE DES MOUVEMENTS LONGITUDINAUX ET TRANSVERSAUX D'UN AVION (Application of an Analog Computer to the Study of the Coupling of an Airplane's Longitudinal and Transverse Movements),
Advisory Group for Aeronautical Research and Development Paris (France)
For primary bibliographic entry see Field 1A.
AD-652 996 HC$3.00 MF$0.65

LES COMMANDES DE VOL CONSIDEREES COMME FORMANT UN SYSTEME ASSERVI (Flight Control Considered as a Slave System),
Advisory Group for Aeronautical Research and Development Paris (France)
J. Gremont. Apr 61, 31p Rept no. AGARD-362
N62-14015
NATO Furnished. Text in French; addendem and discussion in English.

Descriptors: (*Aircraft, *Flight control systems), Flight, Aviation safety, France, Stability.

Consideration is given to the concept of flight control of a piloted aircraft as a servosystem comprising a pilot, the intervening fundamental functions which are the function 'pilot' and the function 'aircraft,' joined to each other by the function 'flight command.' The methods of study on the ground and in flight, and the problems posed by the amelioration of flight qualities and by safety are examined.
AD-652 997 HC$3.00 MF$0.65

METHODES UTILISEES POUR LA MISE AU POINT DE L'AVION BREGUET 940 A AILES SOUFFLEES (Methods Used for the Final Design Analysis of the Breguet 940 'Blower-Wing' Plane),
Advisory Group for Aeronautical Research and Development Paris (France)
G. deRichemont. Apr 61, 25p Rept no. AGARD-371
N62-15540
NATO Furnished. Text in French; discussion partly in English; addendum in English.

Descriptors: (*Short take-off planes, Design), Aerodynamic characteristics, Model tests, Wind tunnel models, Flight testing, Flight simulators, Transport planes, France.
Identifiers: Breguet 940.

Many coordinated methods were utilized in the study of the dynamic characteristics of the aircraft Breguet 940. Methods of study included utilization of a fixed model in a wind tunnel, a motorized flying model, an electronic flight simulator, and observations of the aircraft itself in flight.
AD-652 998 HC$3.00 MF$0.65

A NOTE ON LINEARIZED HEAVE MOTION THEORY FOR AN ANNULAR JET ACV,
Walker (Norman K) Associates Inc Bethesda Md
Peter R. Payne. Apr 64, 26p Rept no. 16
Contract NObs-90127

Descriptors: (*Ground effect machines, Motion), Damping, Ground effect, Linear systems, Theory, Partial differential equations, Jets.

The primary purpose of the report is to delineate the limits for that portion of an ACV's heave damping which is attributable to the cushion.
AD-653 093 HC$3.00 MF$0.65

MONOTONIC AND COMPLETELY REVERSED CYCLIC STRESS-STRAIN AND FATIGUE BEHAVIOR OF REPRESENTATIVE AIRCRAFT METALS.
Illinois Univ Urbana Dept of Theoretical and Applied Mechanics
For primary bibliographic entry see Field 11F.
AD-653 282 HC$3.00 MF$0.65

THE INFLUENCE OF RESPONSE FEEDBACK LOOPS ON THE LATERAL-DIRECTIONAL DYNAMICS OF A VARIABLE-STABILITY TRANSPORT AIRCRAFT.
National Aeronautics and Space Administration. Flight Research Center, Edwards, Calif.
K. J. Szalai. May 67, 47p NASA-TN-D-3966
Contract 720-04-00-01-24

Descriptors: *Aerodynamic stability, *Dynamics, *Feedback control system, *Transport aircraft, Aerodynamic, Control, Direction, Effect, Feedback, Gain, Lateral, Locus, Loop, Response, Roll, Root, Spiral, Stability, System, Variable.

For abstract, see STAR 05 14.
N67-26545 HC$3.00 MF$0.65

WIND-TUNNEL INVESTIGATION OF THE STATIC AERODYNAMIC CHARACTERISTICS OF AN 18-FOOT (5.49-METER) ALL-FLEXIBLE PARAWING.
National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
C. E. Libbey, R. L. Naeseth, and G. M. Ware. Jun 67, 37p NASA-TN-D-3856
Contract 124-07-03-06-23

Descriptors: *Aerodynamic characteristics, *Parawing, Aerodynamic, Angle, Attack, Characteristics, Control, Drag, Flexibility, Lift, Load, Performance, Stability, Static, Structure, Tunnel, Wind.

For abstract, see STAR 05 14.
N67-27271 HC$3.00 MF$0.65

BALLOON SHAPES AND STRESSES BELOW THE DESIGN ALTITUDE.
Technical note,
National Center for Atmospheric Research, Boulder, Colo.
Justin H. Smalley. Dec 66, 27p NCAR-TN-25
Research supported in part by NSF.

Descriptors: (*Balloons, Configuration), Stresses, Tables, Pressure, Design, Altitude, Failure (Mechanics), Weight, Inflatable structures, Spheres, Cylindrical bodies, Geometric forms.

Shapes and stresses were calculated for natural-shape balloons, in equilibrium, at altitudes below their design altitude. The balloon material was assumed to be symmetrically deployed about the vertical axis, and the balloons were assumed to have zero pressure at the bottom apex when at their design altitude. Results are presented for balloons assumed to be weightless; these results are independent of style or design. Results are also presented for three fully tailored balloons with material weight corresponding to summation = 0.2, 0.4, and 1.0, and for two full-cylinder balloons with summation = 0.422 and 0.924. These two types represent the extremes of possible designs. When the zero pressure level is measured in terms of gore length (reducing the effect of balloon size), the changes due to style of design are quite small. A single curve will suffice for many purposes.
PB-174 099 HC$3.00 MF$0.65

1D. AIRCRAFT FLIGHT CONTROL AND INSTRUMENTATION

INVESTIGATION ON THE IMPROVEMENT OF LONGITUDINAL STABILITY OF A JET AIRCRAFT BY THE USE OF A PITCH-DAMPER,
Advisory Group for Aeronautical Research and Development Paris (France)
For primary bibliographic entry see Field 1C.
AD-652 931 HC$3.00 MF$0.65

EVALUATION OF A MOVING-MAP INSTRUMENT DISPLAY IN LANDING APPROACHES WITH A HELICOPTER.
National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
W. Gracey, R. W. Sommer, and D. F. Tibbs. May 67, 23p NASA-TN-D-3986
Contract 721-04-00-10-23

Descriptors: *Approach and landing, *Display system, *Helicopter, *Instrument flight rule (ifr), *Map, Approach, Course, Display, Evaluation, Guidance, Instrument, Landing, Moving, Simulation, System, Test.

For abstract, see STAR 05 14.
N67-26548 HC$3.00 MF$0.65

A METHOD OF DYNAMIC PROGRAMMING AND ITS APPLICATION TO OPTIMIZATION PROBLEMS OF FLIGHT MECHANICS.
National Aeronautics and Space Administration, Washington, D. C.
W. Schulz, and H.-K. Schulze. Jun 67, 25p
NASA-TT-F-483
Transl. Into English of the Paper "die Methode des Dynamic Programming Und Ihre Anwendung Auf Optimierungsaufgaben Der Flugmechanik", Presented At the Annual Meeting of Wiss. Ges. Fur Raketentechnik Und Raumfahrtforschung Berlin, Sep. 14-18, 1964

Descriptors: *Dynamic programming, *Flight mechanics, *Optimization, Accuracy, Calculation, Computer, Dynamic, Flight, Mechanics, Multiple, Path, Payload, Problem, Programming, Ratio, Rocket, Stage.

For abstract, see STAR 05 14.
N67-27280 HC$3.00 MF$0.65

1E. AIR FACILITIES

EVALUATION OF THE AASHO PROFILOMETER FOR MEASURING AIRFIELD PAVEMENT PROFILES.
Cold Regions Research and Engineering Lab., Hanover, N. H.
For primary bibliographic entry see Field 13B.
AD-486 830 HC$3.00 MF$0.65

SNOW STABILIZATION USING DRY PROCESSING METHODS.
Snow Ice and Permafrost Research Establishment Wilmette Ill
For primary bibliographic entry see Field 8L.
AD-652 710 HC$3.00 MF$0.65

2. AGRICULTURE

SEMIANNUAL PROGRESS REPORT (ON AGRICULTURAL RESEARCH), JANUARY 1-JUNE 30, 1966.
UT-AEC Agricultural Research Lab., Oak Ridge, Tenn.
Feb 67, 116p
Contract AT (40-1)-GEN-242

Descriptors: (*Animals, Radiation effects), (*Plants (Botany), Environment), Agriculture, Soils, Fission products, Seeds, Nuclear radiation.

For abstract, see NSA 21 12.
ORO-653 HC$3.00 MF$0.65

2C. AGRICULTURAL ENGINEERING

DAIRY MACHINERY IN WEST GERMANY.
Wegenstein (Knight) G.m.b.H., Duesseldorf (West Germany).
For primary bibliographic entry see Field 5C.
PB-174 777 HC$3.00 MF$0.65

SHORT COURSE ON ROADSIDE DEVELOPMENT (23rd).
Ohio State Univ., Columbus. Dept. of Landscape Architecture.
For primary bibliographic entry see Field 13B.
PB-174 802 HC$3.00 MF$0.65

SHORT COURSE ON HIGHWAY DEVELOPMENT (2nd).
Ohio State Univ., Columbus. Dept. of Landscape Architecture.
For primary bibliographic entry see Field 13B.
PB-174 803 HC$3.00 MF$0.65

SHORT COURSE ON HIGHWAY DEVELOPMENT (4th).
Ohio State Univ., Columbus. Dept. of Landscape Architecture.
For primary bibliographic entry see Field 13B.
PB-174 804 HC$3.00 MF$0.65

SHORT COURSE ON HIGHWAY DEVELOPMENT (7th).
Ohio State Univ., Columbus. Dept. of Landscape Architecture.
For primary bibliographic entry see Field 13B.
PB-174 805 HC$3.00 MF$0.65

SHORT COURSE ON HIGHWAY DEVELOPMENT (8th).
Ohio State Univ., Columbus. Dept. of Landscape Architecture.
For primary bibliographic entry see Field 13B.
PB-174 806 HC$3.00 MF$0.65

SHORT COURSE ON ROADSIDE DEVELOPMENT (9th).
Ohio State Univ., Columbus. Dept. of Landscape Architecture.
For primary bibliographic entry see Field 13B.
PB-174 807 HC$3.00 MF$0.65

SHORT COURSE ON HIGHWAY DEVELOPMENT (5th).
Ohio State Univ., Columbus. Dept. of Landscape Architecture.
For primary bibliographic entry see Field 13B.
PB-174 810 HC$3.00 MF$0.65

SHORT COURSE ON ROADSIDE DEVELOPMENT (6th).
Ohio State Univ., Columbus. Dept. of Landscape Architecture.
For primary bibliographic entry see Field 13B.
PB-174 811 HC$3.00 MF$0.65

SHORT COURSE ON ROADSIDE DEVELOPMENT (10th).
Ohio State Univ., Columbus. Dept. of Landscape Architecture.
For primary bibliographic entry see Field 13B.
PB-174 812 HC$3.00 MF$0.65

SHORT COURSE ON ROADSIDE DEVELOPMENT (11th).
Ohio State Univ., Columbus. Dept. of Landscape Architecture.
For primary bibliographic entry see Field 13B.
PB-174 813 HC$3.00 MF$0.65

SHORT COURSE ON ROADSIDE DEVELOPMENT (12th).
Ohio State Univ., Columbus. Dept. of Landscape Architecture.
For primary bibliographic entry see Field 13B.
PB-174 814 HC$3.00 MF$0.65

SHORT COURSE ON ROADSIDE DEVELOPMENT (13th).
Ohio State Univ., Columbus. Dept. of Landscape Architecture.
For primary bibliographic entry see Field 13B.
PB-174 815 HC$3.00 MF$0.65

SHORT COURSE ON ROADSIDE DEVELOPMENT (14th).
Ohio State Univ., Columbus. Dept. of Landscape Architecture.
For primary bibliographic entry see Field 13B.
PB-174 816 HC$3.00 MF$0.65

SHORT COURSE ON ROADSIDE DEVELOPMENT (15th).
Ohio State Univ., Columbus. Dept. of Landscape Architecture.
For primary bibliographic entry see Field 13B.
PB-174 817 HC$3.00 MF$0.65

SHORT COURSE ON ROADSIDE DEVELOPMENT (16th).
Ohio State Univ., Columbus. Dept. of Landscape Architecture.
For primary bibliographic entry see Field 13B.
PB-174 818 HC$3.00 MF$0.65

SHORT COURSE ON ROADSIDE DEVELOPMENT (17th).
Ohio State Univ., Columbus. Dept. of Landscape Architecture.
For primary bibliographic entry see Field 13B.
PB-174 819 HC$3.00 MF$0.65

SHORT COURSE ON ROADSIDE DEVELOPMENT (18th).
Ohio State Univ., Columbus. Dept. of Landscape Architecture.
For primary bibliographic entry see Field 13B.
PB-174 820 HC$3.00 MF$0.65

SHORT COURSE ON ROADSIDE DEVELOPMENT (19th).
Ohio State Univ., Columbus. Dept. of Landscape Architecture.
For primary bibliographic entry see Field 13B.
PB-174 821 HC$3.00 MF$0.65

SHORT COURSE ON ROADSIDE DEVELOPMENT (24th).
Ohio State Univ., Columbus. Dept. of Landscape Architecture.
For primary bibliographic entry see Field 13B.
PB-174 825 HC$3.00 MF$0.65

3. ASTRONOMY AND ASTROPHYSICS

3A. ASTRONOMY

RESULTS OF THE FIRST INFRARED ASTRONOMICAL ROCKET FLIGHT,
Cornell Univ Ithaca N Y Center for Radiophysics and Space Research
For primary bibliographic entry see Field 17E.
AD-652 722 Not available from CFSTI.

ON THE DECELERATION OF METAGALACTIC CLOUDS IN THE GALAXY,
Columbia Univ New York Dept of Astronomy
L. Woltjer, G. Puppi, and G. Setti. 29 Jul 66, 3p
AFOSR-67-1125
Contract AF 49 (638)-1358
Prepared in cooperation with Bologna Univ. (Italy). Istituto di Fisica, and Rome Astronomical Observatory (Italy).
Availability: Published in Il Nuovo Cimento v45 Ser10 p252-3 Oct 11 1966.

Descriptors: (*Galaxies, Clouds), (*Hydrogen, Interstellar matter), Velocity, Deceleration, Gases, Cosmic rays, Gravity, Light.

Recent 21 cm observations have shown the existence of high-velocity clouds of neutral hydrogen at high galactic latitudes. The radial velocities appear to be all negative and thus these clouds apparently fall into the disk of the Galaxy. If the clouds are of extragalactic origin, by what mechanism are the velocities reduced from a free-fall velocity to much smaller observed nature. This paper discusses that the deceleration is partly due to the work done by the in-falling material on the relativistic cosmic-ray gas. (Author)
AD-652 751 Not available from CFSTI.

ARE YOUNG GALAXIES VISIBLE. II. THE INTEGRATED BACKGROUND,
Princeton Univ N J Palmer Physical Lab
R. B. Partridge, and P. J. E. Peebles. 26 Sep 66, 21p
Grant NSF-GP-579
Research supported in part by ONR.
Availability: Published in The Astrophysical Journal v148 p377-97 May 1967.

Descriptors: (*Galaxies, Models (Simulations)), (*Infrared radiation, Galaxies), Stars, Light, Isotope availability, Interstellar matter, Zodiacal light, Blackbody radiation, Hydrogen, Helium.

In a previous publication we presented a model for the formation of galaxies and for the properties of the young galaxies. In this article the time variation of the luminosity and spectrum of the model galaxy is used to compute the integrated background radiation due to the highly redshifted starlight from all the galaxies. This background is compared with the contribution from other sources, local and extragalactic. It is concluded that in the wavelength range from 5 to 15 microns it may be possible to pick out the integrated light of the distant galaxies. The intensity is within reach of present detection techniques. (Author)
AD-652 777 Not available from CFSTI.

SOLAR OBLATENESS AND GENERAL RELATIVITY.
Technical rept.,
Princeton Univ N J Palmer Physical Lab
R. H. Dicke, and H. Mark Goldenberg. 13 Jan 67, 5p
Contract Nonr-1858 (30)
Research supported in part by NSF.
Availability: Published in Physical Review Letters v18 n9 p313-6 Feb 27 1967.

Group 3A — Astronomy

Descriptors: (*Mercury (Planet), Precession), (*Relativity theory, Mercury (Planet)), (*Sun, Rotation), Quadrupole moments, Solar wind, Gravity, Astrophysics.

New measurements of the solar oblateness have given a value for the fractional difference of equatorial and polar radii of (5.0 + or - 0.7) x 10 to the -5 power. A corresponding discrepancy of 8% of the Einstein value for the perihelion motion of Mercury is implied. (Author)
AD-652 778 Not available from CFSTI.

ISOTROPY AND HOMOGENEITY OF THE UNIVERSE FROM MEASUREMENTS OF THE COSMIC MICROWAVE BACKGROUND.
Princeton Univ N J Palmer Physical Lab
For primary bibliographic entry see Field 4A.
AD-652 779 Not available from CFSTI.

OBSERVATIONS OF OH EMISSION IN THE H II REGION W3 WITH A 74400LAMBDA INTERFEROMETER,
Massachusetts Inst of Tech Cambridge Research Lab of Electronics
J. M. Moran, A. H. Barrett, B. F. Burke, B. Zuckerman, and M. L. Meeks. 17 Mar 67, 4p
Contract DA-28-043-AMC-02536 (E), Grant NsG-419
Prepared in cooperation with Massachusetts Inst. of Tech., Lexington, Lincoln Lab., and Harvard Univ., Cambridge.
Availability: Published in The Astrophysical Journal v148 n2 pL69-72 1967.

Descriptors: (*Astronomical data, Resolution), Ions, Interferometers, Brightness, Temperature, Antennas.

Increased angular resolution has been obtained of this region with a new interferometer, by using the 84 foot Millstone antenna at Lincoln Laboratory, and the 60 foot antenna at the Agassiz Field Station of Harvard College Observatory.
AD-652 914 Not available from CFSTI.

GRAVITATIONAL RADIATION FROM NEUTRON STARS,
Columbia Univ New York
Wai-yin Chau. 11 Jul 66, 11p
AFOSR-67-1172
Contract AF 49 (638)-1358, Grant NGR-33-008-053
Availability: Published in The Astrophysical Journal v147 n2 p664-71 Feb 1967.

Descriptors: (*Gravity, *Stars), (*Mathematical analysis, *Stars), Astrophysics, Neutrons, Energy, Oscillation, Velocity, Rotation, Momentum, Equations, Numerical analysis.

Gravitational radiation from pulsating and rotating objects is calculated using the formula obtained with the weak field limit of general relativity. The cases of rotation and oscillation are first considered separately. Then the effects of rotation on radial oscillations are investigated. Numerical estimates are made with data relevant to a neutron star. It is concluded that most of the energy a neutron star may acquire during its formation is dissipated rapidly, unless the rotation is quite slow. (Author)
AD-653 048 Not available from CFSTI.

NUCLEAR PROCESSES IN COMETS,
Palomar Observatory Pasadena Calif
Jesse L. Greenstein. 1965, 8p
AFOSR-67-1174
Contract AF 49 (638)-1323
Prepared in cooperation with Mount Wilson Observatory, Pasadena, Calif.
Availability: Published in Proceedings Intern. Colloq. U. Liege 5-7 Jul 1965 Belgium p483-8.

Descriptors: (*Comets, Nuclear reactions), Space environmental conditions, Solar wind, Solar radiation, Cosmic rays, Solar flares, Solar disturbances, Protons, Isotope availability.

Some effects on the material of comets by Solar Wind Energy Protons (500 kev) and the 10 to 100 mev protons from flares as well as of prolonged exposure to galactic cosmic rays are discussed. It is concluded that neither the present galactic or solar flux affects the composition of the outer few centimeter of a comet solid in reasonable lifetimes. Any variations of isotope ratios must be primeval. The integrated effects would be visible if we can sample the solid material and search for trace elements like D, Li, Be, B in very low concentrations. (Author)
AD-653 049 Not available from CFSTI.

SPECTROPHOTOMETRY OF GALACTIC NEBULAE ORION NEBULA.
Annual summary rept., 1 Nov 64-31 Oct 65,
Hamburger Sternwarte (Germany)
K. Wurm. 30 Nov 65, 15p
AFCRL-66-210
Contract AF 61 (052)-810

Descriptors: (*Nebulae, Interstellar matter), Dust, Stars, Electron density, Gases, Brightness, Optical properties, Spectroscopy.
Identifiers: Orion Nebula.

An Annual Summary Report is represented for the time 1 Nov 64 to 31 Oct 65. The completed work concerns in the first line the internal physical structure of the Orion Nebula as in particular the optical thickness of the nebular layers with respect to the dust extinction, the positions of the bright stars in the field relative to each other in the line of sight and the arrangement of the visible masses in space. (Author)
AD-653 208 HC$3.00 MF$0.65

PLASMA PHYSICS IN AN ASTROPHYSICAL ENVIRONMENT.
Final scientific rept., 15 Nov 65-14 Nov 66.
King's Coll London (England)
Dec 66, 12p
AFCRL-67-0195
Contract AF 61 (052)-908

Descriptors: (*Stars, Magnetic fields), (*Plasma medium, Magnetic fields), Astrophysics, Rotation, Plasma oscillations, Stability, Binary stars, Models (Simulations), Turbulence.

The stabilizing influence of a magnetic field on a differentially rotating star has been investigated and it has been demonstrated that a field of one gauss or more can prevent the development of a high degree of non uniform rotation during the early contactional stages of a star's evolution, and so prevent the formation of double stars. The effect of uniform rotation on the non radial modes of oscillation of a star has been investigated and the resulting oscillation frequencies and velocities calculated. This work has been extended to non uniformly rotating stars and results obtained so far indicate that differential rotation can cause instability. The effect of uniform rotation on the internal structure and observational properties of stars has also been actively investigated and results are given demonstrating these changes for a wide range a masses and rotational velocities. The transport of energy through low density surface layers of stars has been investigated for distorted stars, and the variation of emergent energy with position on the surface is given.
AD-653 211 HC$3.00 MF$0.65

ACCURATE POSITIONS OF SELECTED 4C SOURCES,
California Inst of Tech Pasadena Owens Valley Radio Observatory
For primary bibliographic entry see Field 3B.
AD-653 260 HC$3.00 MF$0.65

THE EAST-WEST STRUCTURE OF RADIO SOURCES AT 1425 MHz,
California Inst of Tech Pasadena Owens Valley Radio Observatory
For primary bibliographic entry see Field 3B.
AD-653 261 HC$3.00 MF$0.65

ON THE MAGNETOSPHERES OF SELF-GRAVITATING BODIES,
Columbia Univ New York Dept of Astronomy
For primary bibliographic entry see Field 20H.
AD-653 324 Not available from CFSTI.

RADAR OBSERVATIONS OF VENUS AT 3.8-cm WAVELENGTH,
Massachusetts Inst of Tech Lexington Lincoln Lab
J. V. Evans, R. P. Ingals, L. P. Rainville, and R. R. Silva. 12 Jul 66, 15p Rept no. JA-2797
ESD-TR-67-173
Contract AF 19 (628)-5167
Availability: Published in Astronomical Journal v71 n9 p902-15 Nov 1966.

Descriptors: (*Venus (Planet), Radio astronomy), (*Rotation, Venus (Planet)), Mercury (Planet), Doppler radar, Planetary atmospheres, Spin, Radar echo areas, Anomalies, Scattering, Atmosphere models.

During the early part of 1966 the Lincoln Laboratory Haystack Radar (wavelength = 3.8 cm) was used to observe the planet Venus. The radar cross section observed at this wavelength was only about one-tenth as much as has been reported at wavelengths of 12 cm or longer. Our measurements support the low value for the cross section reported by Karp et al. (1964). The echo spectrum is found to be comparatively narrow, suggesting the solid surface as the reflecting agent. No echo power can be observed outside the frequency limits expected on the basis of the known rotation rate and the center Doppler shift measured using a separate 23 cm wavelength radar. If any energy is reflected by the atmosphere it appears to be only a small portion of the total. Confirmation that the surface is the scattering agent has been provided by near simultaneous ranging experiments at two frequencies, which showed that the echo delay times agreed to 5 microsec. The depolarized component of the echoes was observed and found to be of the order of 14 dB weaker than the expected component. An analysis of the scattering law for the planet has been made, and when compared with the law observed at longer wavelengths indicates that about 4-6 dB two-way vertical absorption occurs in the atmosphere of Venus. Variations in the observed cross section with time support the view that atmospheric attenuation is responsible at least in part for the low cross section observed. A comparison of the positions of anomalously reflecting regions observed in these observations with the positions reported by Carpenter (1966) during the 1964 inferior conjunction permits the Venus rotation period to be established as 244 plus or minus a few days.
AD-653 360 Not available from CFSTI.

INSTRUMENTATION FOR MEASUREMENT OF COSMIC NOISE AT 750, 1225, AND 2000 K HZ FROM A ROCKET FINAL TECHNICAL REPORT.
Michigan Univ., Ann Arbor. Dept. of Electrical Engineering.
H. W. Estry, W. J. Lindsay, D. D. Majeske, R. L. Miller, and D. Walsh. Feb 67, 144p NASA-CR-84151, REPT.-67-2
Grant NSG-572

Descriptors: *Cosmic noise, *Noise measurement, *Rocket instrumentation, Antenna, Calibration, Cosmic, Design, Environment, Frequency, Impedance, Instrumentation, Intensity, Ionosph-

ere. Measurement, Noise, Payload, Performance, Radio, Radiometer, Rocket, Telemetry, Testing.

For abstract, see STAR 05 14.
N67-26513 HC$3.00 MF$0.65

REVIEW OF NASA SPONSORED RESEARCH AT THE EXPERIMENTAL ASTRONOMY LABORATORY.
Massachusetts Inst. of Tech., Cambridge. Experimental Astronomy Lab.
For primary bibliographic entry see Field 22C.
For abstract, see STAR 05 14.
N67-26521 HC$3.00 MF$0.65

MODIFICATIONS FOR THE IMPROVEMENT OF THE CONNES INTERFEROMETER FINAL SCIENTIFIC REPORT, 1 DEC. 1964 - 1 SEP. 1966.
Centre National de La Recherche Scientifique, Bellevue (France).
For primary bibliographic entry see Field 20F.
For abstract, see STAR 05 14.
N67-27053 HC$3.00 MF$0.65

3B. ASTROPHYSICS

SYNCHROTRON RADIATION OF NEUTRINOS AND ITS ASTROPHYSICAL SIGNIFICANCE.
Doctoral thesis.
Columbia Univ New York Dept of Astronomy
John Darlington Landstreet. 19 Jul 66. 7p
AFOSR-67-1147
Contract AF 49 (638)-1358
Availability: Published in The Physical Review v153 n5 p1372-7 Jan 25 1967.

Descriptors: (*Neutrinos, Nuclear reactions), (*Stars, Neutrinos), Astrophysics, Magnetic fields, Electrons, Relativity theory, Interactions, Gravity.
Identifiers: Evolution methods, White dwarf stars, Neutrino synchrotron radiation.

The neutrino radiation from a completely relativistic electron gas in the presence of a large magnetic field (the neutrino analog of electromagnetic synchrotron radiation) is computed approximately, under the assumption of a direct electron-neutrino interaction. The radiation is also estimated in the case of a non-relativistic electron gas. It is shown that the radiation increases strongly with electron energy and magnetic-field strength, and is therefore most likely to have astrophysical significance in the evolution of stars with large electron energies and potentially large magnetic fields, such as white dwarfs. However, computation of the total neutrino luminosity of several model white dwarfs shows that the neutrino luminosity is limited by electron degeneracy to values much less than the photon luminosity. The process is also found to be relatively unimportant in the evolution of neutron stars. (Author)
AD-652 753 Not available from CFSTI.

SPECTRUM OF 3C273.
Arecibo Ionospheric Observatory Puerto Rico
C. Hazard, S. Gulkis, and A. D. Bray. 1966. 11p
AFOSR-67-1130
Contract AF 49 (638)-1156
Availability: Published in Nature v212 n5061 p461-3 Oct 29 1966.

Descriptors: (*Radio astronomy, Astronomical data), (*Extraterrestrial radio waves, Astronomical data), Spectroscopy, Puerto Rico, Moon, Astrophysics, Radio waves, Electromagnetic waves.
Identifiers: 3C273.

This article describes the radio frequency spectrum of 3C273 based primarily on two occultation observations made using the 1000 foot steerable radio telescope at Arecibo, Puerto Rico. The results presented show that although the spectrum of the total flux of 3C273 is apparently quite simple, it is in fact composed of the superposition of a number of complex spectra arising in the fine structure within the source. In particular, the spectrum of component B is very complex, the most remarkable feature being the change from a positive to a negative spectral index between 100 and 200 Mc/s. (Author)
AD-652 757 Not available from CFSTI.

A NEW DETERMINATION OF THE C12/C13 ISOTOPIC ABUNDANCE RATIO IN THE SOLAR PHOTOSPHERE.
Liege Univ Cointe-Sclessin (Belgium) Institut D'Astrophysique
Luise Herzberg, L. Delbouille, and G. Roland.
28 Jul 66. 7p
Contract AF 61 (052)-685
Prepared in cooperation with Defence Research Telecommunications Establishment, Ottawa (Ontario).
Availability: Published in The Astrophysical Journal v147 n2 p697-702 Feb 1967.

Descriptors: (*Solar spectrum, Ultraviolet radiation), (*Isotope availability, Solar atmosphere), (*Carbon, Solar atmosphere), Solar radiation, Solar systems, Venus (Planet), Comets, Meteorites, Spectra (Visible + ultraviolet).

The 3874-3875 A region of the solar spectrum is re-examined for the occurrence of lines of the 0-0 band of the ultraviolet system of the C13N isotopic molecule. Although the well-known solar line 3874.341 A is in excellent wavelength agreement with the P (58) line measured in the laboratory, the P (57) line that should also occur in a window in the solar spectrum is found to be absent. It is, therefore, concluded that the wavelength agreement in the case of the P (58) line is spurious and that no lines of C13N are observed. From this, a lower limit of about 40 for the C12/C13 abundance ratio in the photosphere is obtained. (Author)
AD-652 767 Not available from CFSTI.

CHANDRASE HAR'S PLANETARY PROBLEM WITH INTERNAL SOURCES.
Rand Corp Santa Monica Calif
R. Bellman, H. Kagiwada, R. Kalaba, and S. Ueno. May 67. 24p Rept no. RM-5229-PR
Contract F44620-67-C-0045
See also AD-646 969.

Descriptors: (*Planetary atmospheres, Digital computers), (*Solar radiation, *Satellites (Artificial)), Earth (Planet), Clouds, Altitude, Numerical methods and procedures, Differential equations, Integral equations.

Invariant imbedding equations are developed for the determination of the vertical stratification of terrestrial and other planetary atmospheres on the basis of satellite observations. The top altitude of a cloud, for example, can be estimated from the relative spectral intensities of the solar radiation reflected from the cloud in the oxygen 'A' band at 7600 angstrom, and in a nearby window. The results of RM-5245-PR are extended to solve the Chandrasekhar planetary problem for atmospheres with or without internal energy sources, and with or without bottom surface reflectivity, either Lambert or nonorthotropic. The differential-integral equations may be approximated by systems of stable initial-value problems that are readily and accurately solved by digital computers.
AD-652 832 HC$3.00 MF$0.65

GALACTIC DEUTERIUM AND ITS ENERGY SPECTRUM ABOVE 20 MeV PER NUCLEON.
Chicago Univ Ill Enrico Fermi Inst for Nuclear Studies
C. Y. Fan, George Gloeckler, and J. A. Simpson.
31 May 66. 7p
AFOSR-67-1204
Contract AF 49 (638)-1642, Grant NsG-179-61
Availability: Published in Physical Review Letters v17 n6 p329-33 Aug 8 1966.

Descriptors: (*Deuterium, Interstellar matter), (*Cosmic rays, Deuterium), Astrophysics, Protons, Spallation, Solar disturbances, Scientific satellites, Helium, Isotope availability, Nuclear reactions, Experimental data.

The fluxes and energy spectra of deuterium, protons, and helium were measu red on the IMP-III satellite at a time near minimum solar activity. The deuterium differential energy spectrum in the range 17-63 MeV/nucleon is proportional to E +2 power and, at 60 MeV/nucleon, the relative abundance ratios are H2/He4 = 0.15 and H2/H1 = 0.05. If present values of experimental cross sections for the production of H2 from nucleon interactions with He4 are used, the observed deuterium abundance may be accounted for by the traversal of He4 through 4 to 6 g/sq cm2 of matter in cosmic-ray sources and the interstellar medium. (Author)
AD-652 949 Not available from CFSTI.

ANISOTROPIC PROPAGATION OF SOLAR PROTONS DEDUCED FROM SIMULTANEOUS OBSERVATIONS BY EARTH SATELLITES AND THE MARINER-IV SPACE PROBE.
Chicago Univ Ill Enrico Fermi Inst for Nuclear Studies
J. J. O'Gallagher, and J. A. Simpson. 16 May 66. 8p
AFOSR-67-1212
Contract AF 49 (638)-1642, Grant NsG-690
Availability: Published in Physical Review Letters v16 n26 p1212-7 Jun 27 1966.

Descriptors: (*Solar wind, Space environmental conditions), (*Protons, Solar radiation), Scientific satellites, Space probes, Solar flares, Magnetic fields, Cosmic ray telescopes, Cosmic rays, Anisotropy.
Identifiers: Mariner.

This report presents experimental evidence that (a) some solar-flare protons are strongly confined to propagate in magnetic field regions which have the same characteristics as corotating sector structures and that these proton fluxes share this corotation; (b) the anisotropic propagation is so dominated by the prevailing magnetic field structures that differences in heliocentric longitude less than 40 degrees are decisive for whether or not solar-flare particles may reach Earth, or any given point in space; and (c) the protons continually observed as 27-day recurring events in earlier experiments are confined to corotating regions extending beyond 1.5 A.U. for several solar rotations. (Author)
AD-652 951 Not available from CFSTI.

GRAVITATIONAL RADIATION FROM NEUTRON STARS.
Columbia Univ New York
For primary bibliographic entry see Field 3A.
AD-653 048 Not available from CFSTI.

ON THE ROTATIONAL TEMPERATURE OF A SUNSPOT.
Revised ed.,
Palomar Observatory Pasadena Calif
Aert Schadee. 25 Jan 66. 4p
AFOSR-67-1184
Contract AF 49 (638)-1323
Revision of manuscript submitted 18 Nov 65. Prepared in cooperation with Mount Wilson Observatory, Pasadena, Calif.
Availability: Published in Astrophysical Journal v145 n1 p348-9 Jul 1966.

Descriptors: (*Sunspots, Solar spectrum), Astrophysics, Titanium compounds, Temperature, Solar radiation, Line spectrum, Molecular spectroscopy.

A discussion about the rotational temperature of a sunspot based on the measured strength of certain lines in the emission spectra of the titanium oxide gamma-system. (Author)
AD-653 050 Not available from CFSTI.

ENHANCED INTERPLANETARY SCINTILLATIONS ASSOCIATED WITH SOLAR FLARES,
Cornell Univ Ithaca N Y Center for Radiophysics and Space Research
L. E. Sharp, and D. E. Harris. 12 Dec 66, 6p
AFOSR-67-1179
Contract AF 49 (638)-1156
Availability: Published in Nature v213 n5074 p377-8 Jan 28 1967.

Descriptors: (*Solar flares, Space environmental conditions), (*Scintillation, Space environmental conditions), Electron density, Solar disturbances, Shock waves, Solar wind, Astrophysics.

Results of scintillation observations during March 1966 at the Arecibo Ionospheric Observatory are presented together with a brief description of probable effects which the disturbed interplanetary medium should have on this type of measurement. A four to eightfold increase of scintillation index was found for three sources after a number of class II and III flares occured during several days preceeding the observations. It is concluded that this reflects at least a similar increase in the electron density fluctuation level. (Author)
AD-653 052 Not available from CFSTI.

TABLE OF SOLAR ALTITUDES FOR GEOGRAPHICAL LATITUDES PLUS OR MINUS 77 10'.
Cold Regions Research and Engineering Lab Hanover N H
For primary bibliographic entry see Field 4B.
AD-653 145 HC$3.00 MF$0.65

IONOSPHERIC RESEARCH.
Illinois Univ Urbana Electrical Engineering Research Lab
For primary bibliographic entry see Field 4A.
AD-653 160 HC$3.00 MF$0.65

THE HELIOCENTRIC INTENSITY GRADIENTS OF COSMIC-RAY PROTONS AND HELIUM DURING MINIMUN SOLAR MODULATION,
Chicago Univ Ill Enrico Fermi Inst for Nuclear Studies
J. J. O'Gallagher, and J. A. Simpson. 7 Dec 66, 11p
AFOSR-67-1198
Contract AF 49 (638)-1642, Grant NsG-179-61
Availability: Published in Astrophysical Journal v147 n2 p819-27 Feb 1967.

Descriptors: (*Cosmic rays, *Solar systems), (*Intensity, *Helium), (*Protons, Intensity), Space probes, Astrophysics, Energy, Interstellar matter, Modulation, Earth (Planet), Telescopes.
Identifiers: Mariner.

The Mariner-IV space probe carried a 3-element cosmic ray telescope to 1.56 a.u. in 1965. The intensity gradients in the solar system are: for galactic helium, (65 plus or minus 8)%/a.u. and (55 plus or minus 5)%/a.u. in the energy ranges 100 - 300 and 300 - 420 MeV/nucleon, respectively; for galactic protons, (9.6 plus or minus 0.9)%/a.u. at the mean energy approximately equals 6000 MeV. These results prove that a large gradient persists, hence the interstellar spectrum is different from the spectrum observed near Earth at the time of minimum solar modulation. (Author)
AD-653 240 Not available from CFSTI.

DETACHMENT OF ELECTRONS FROM H (-) BY ELECTRON IMPACT,
Joint Inst for Lab Astrophysics Boulder Colo
G. Tisone, and L. M. Branscomb. 27 Jun 66, 5p
AROD-4445:78
Contract DA-31-124-ARO (D)-139, ARPA Order-0492
Availability: Published in Physical Review Letters v17 n5 p236-8 1966.

Descriptors: (*Stars, *Gas ionization), (*Hydrogen, *Electron bombardment), Neutralization, Probability, Ion beams, Interactions, Ionization potentials, Photon bombardment.
Identifiers: Defender project.

The negative ion of atomic hydrogen, H (-), is the predominant source of opacity in most stellar photospheres. Among the collision processes responsible for its destruction, and hence contributing to the approach to local thermodynamic equilibrium in its abundance, is ionization by electron impact: e + H (-) to H + 2e. A report is given of an experimental determination of the absolute cross section of the process at 100-eV electron energy, and the energy dependence from 30 to 500 eV.
AD-653 247 Not available from CFSTI.

THE POST-NEWTONIAN EFFECTS OF GENERAL RELATIVITY ON THE EQUILIBRIUM OF UNIFORMLY ROTATING BODIES. III. THE DEFORMED FIGURES OF THE JACOBI ELLIPSOIDS. IV. THE ROCHE MODEL,
Chicago Univ Ill
For primary bibliographic entry see Field 20D.
AD-653 251 Not available from CFSTI.

ACCURATE POSITIONS OF SELECTED 4C SOURCES,
California Inst of Tech Pasadena Owens Valley Radio Observatory
E. T. Olsen. 1967, 18p Rept no. 6
Contract N00014-67-0094-0008

Descriptors: (*Radio astronomy, Astronomical data), Spectroscopy, Position finding, Interferometers, Tables.
Identifiers: 4C sources.

Positions and flux densities at 1417 MHz of 490 radio sources have been measured using the two 90-ft steerable paraboloids at the Owens Valley Radio Observatory as an east-west and a north-south interferometer. After confusion has been taken into account, most of the positions are accurate to within plus or minus 20 sec. in each coordinate and most flux densities to within plus or minus 0.1 f.u. (Author)
AD-653 260 HC$3.00 MF$0.65

THE EAST-WEST STRUCTURE OF RADIO SOURCES AT 1425 MHz,
California Inst of Tech Pasadena Owens Valley Radio Observatory
E. B. Fomalont. 1967, 79p Rept no. 7
Contract N00014-67-A-0094-0008

Descriptors: (*Radio astronomy, Astronomical data), Spectroscopy, Position finding, Interferometers, Tables.
Identifiers: Visibility functions.

The east-west brightness distribution of over 500 radio sources, 200 of them resolved, are given in tabular and graphical form. The observations were taken with the Caltech twin-element interferometer at a frequency of 1425 MHz. Nine separations from 144 wavelengths to 2626 wavelengths were used to synthesize an east-west fan beam of 45 seconds of arc.
AD-653 261 HC$3.00 MF$0.65

THE 9.1-cm SPECTROHELIOGRAM OF MAY 20, 1966,
Stanford Univ Calif Radio Astronomy Inst
R. N. Bracewell, and J. Deuter. 26 Aug 66, 4p
AFOSR-67-1225
Contract AF 18 (603)-53
Availability: Published in Journal of Geophysics Research v72 n1 p37-8 Jan 1 1967.

Descriptors: (*Solar eclipses, Scientific research), Temperature, Brightness, Microwaves, Data.
Identifiers: Spectroheliogram.

At the time of the annular eclipse of May 20, 1966, six or more radio plages were evident at 9.1 cm. The three strongest had peak brightness temperatures around 500,000 degrees K as observed with a beamwidth of 3 minutes of arc. Details of the brightness distribution are presented. (Author)
AD-653 352 Not available from CFSTI.

RADAR OBSERVATIONS OF VENUS AT 3.8-cm WAVELENGTH,
Massachusetts Inst of Tech Lexington Lincoln Lab
For primary bibliographic entry see Field 3A.
AD-653 360 Not available from CFSTI.

THE EQUILIBRIUM OF SLOWLY ROTATING CONFIGURATIONS IN THE POST-NEWTONIAN APPROXIMATION: CORRECTIONS TO CLAIRAUT'S EQUATION; THE APPEARANCE OF A ROTATING CONFIGURATION AS VIEWED FROM INFINITY.
Chicago Univ Ill
For primary bibliographic entry see Field 20D.
AD-653 376 Not available from CFSTI.

STABILITY OF AXISYMMETRIC FIGURES OF EQUILIBRIUM OF A ROTATING CHARGED LIQUID DROP,
Chicago Univ Ill Dept of Physics
Carl E. Rosenkilde. 30 May 66, 21p
Contract Nonr-2121 (24)
Prepared in cooperation with California Research Corp., Richmond.
Availability: Published in Journal of Mathematical Physics v8 n1 p98-118 Jan 1967.

Descriptors: (*Stars, Models (Simulations)), (*Drops, Hydrodynamics), Tensor analysis, Nuclear models, Liquids, Rotation, Stability, Incompressible flow, Oscillation, Ground state, Equations of state, Theorems, Parity.
Identifiers: Virial theorem.

The method of the tensor virial is used to investigate the equilibrium and stability of a rotating, uniformly charged (with a total charge Q), incompressible liquid drop (of volume V) held together by a constant surface tension T. The tensor virial theorems provide relations which define the sequences of equilibrium figures and perturbation equations which govern the oscillations. Since spheroids satisfy the virial theorems of orders one, two, and three, the stability of exact axisymmetric equilibrium figures with respect to second- and third-harmonic deformations can be inferred from the nature of the characteristic oscillation frequencies of spheroids. As the rotation increases for a given fissionability parameter $x = Q$ sq./10TV ($0 < \text{or} = x < 1$), a sequence of oblate spheroids representing initially stable rotating ground states exhibits a neutral point (where an ellipsoidal sequence bifurcates), but remains stable (in the absence of dissipation) until one of the three second-harmonic modes of vibration (the toroidal or gamma mode) becomes overstable. Later, for third harmonics, it exhibits a second neutral point (where a sequence of asymmetric figures bifurcates), but again remains stable until the onset of the associated overstability. A third neutral point does not indicate the bifurcation of pear shapes. The error in using oblate spheroids is less than 5% up to the first overstable point. One class of saddle shapes can be represented by prolate spheroids (which must rotate about the symmetry axis) in the neighborhood of $x = 1$. They are initially unstable with respect to the other two second-harmonic

modes of vibration (the pulsation or beta mode and the transverse-shear mode). (Author)
AD-653 395 Not available from CFSTI.

ON THE INFLUENCE OF ATMOSPHERIC TRANSMISSION FUNCTIONS ON INFRARED MEASUREMENTS IN PLANETARY ATMOSPHERES, PART II FINAL REPORT.
Ludwig-maximilians-universitat, Munich (West Germany).
I. Tannhaeuser. Jan 67, 75p NASA-CR-84157
Grant NSG-305

Descriptors: *Earth atmosphere, *Infrared astronomy, *Planetary atmosphere, *Radiation spectrum, Astronomy, Atmosphere, Carbon dioxide, Carbon monoxide, Earth, Infrared, Measurement, Methane, Nimbus satellite, Nitrous, Oxide, Planetary, Radiation, Satellite, Spectrum, Water.

For abstract, see STAR 05 14.
N67-26507 HC$3.00 MF$0.65

CRATER STATISTICS AND EROSION.
Bellcomm, Inc., Washington, D. C.
R. J. Collins, and B. G. Smith. 3 Mar 67, 25p
NASA-CR-84153, TR-67-340-1
Contract NSR-24-005-047
Presented At the Aas Symp. on the Phys. of the Moon, Washington, D. C., 29 Dec. 1966

Descriptors: *Erosion, *Lunar crater, *Meteoroid crater, Crater, Distribution, Equilibrium, Impact, Lunar, Meteoroid, Selenography, Size, Statistics.

For abstract, see STAR 05 14.
N67-26511 HC$3.00 MF$0.65

RESEARCH INVESTIGATION DIRECTED TOWARD EXTENDING THE USEFUL RANGE OF THE ELECTROMAGNETIC SPECTRUM PROGRESS REPORT, 1 MAY - 31 OCT. 1966.
Columbia Univ., New York. Columbia Radiation Lab.
For primary bibliographic entry see Field 7D.
For abstract, see STAR 05 14.
N67-26616 HC$3.00 MF$0.65

RETRIEVABLE MARS PROBE DEFINITION.
Brown Engineering Co., Inc., Huntsville, Ala.
For primary bibliographic entry see Field 22A.
For abstract, see STAR 05 14.
N67-26635 HC$3.00 MF$0.65

PART I - RESEARCH ON THE HETEROGENEOUS STRUCTURE OF THE SOLAR ATMOSPHERE. A PROGRESS REPORT, 1964-1966. PART II - LAMBDAMETER NO. 2 FINAL SCIENTIFIC REPORT.
Observatoire de Paris (France). Service Solaire.
R. Michard. 31 Oct 66, 24p AFCRL-67-0094, AD-647502
Contract AF 61/052/-785

Descriptors: *Engineering development, *Measuring apparatus, *Recording instrument, Solar atmosphere, *Spectrography, *Structure, Apparatus, Atmosphere, Chromosphere, Communication, Component, Design, Development, Displacement, Doppler effect, Electric, Engineering, Field, Granule, Heterogeneity, Instrument, Kinematics, Layer, Magnetic, Measuring, Mechanical, Observation, Photosphere, Recording, Solar, Spectrograph, Zeeman effect.

For abstract, see STAR 05 14.
N67-26785 HC$3.00 MF$0.65

OBSERVATIONS OF GALACTIC AND EXTRAGALACTIC EMISSION AT 408 MC/S. THE DETERMINATION OF THE ACCURATE POSITIONS OF RADIO SOURCES BY THE LUNAR OCCULATION TECHNIQUE. OBSERVATIONS OF EMISSION FROM FLARE STARS PROGGRESS REPORT, OCT. - DEC. 1965.
Manchester Univ., Macclesfield (England). Nuffield Radio Astronomy Labs.
C. G. Haslam, A. C. Lovell, A. G. Lyne, and M. J. Quigley. Dec 65, 6p PR-1, AD-648576
Contract N62558-3928

Descriptors: *Extragalactic radiation, *Galactic radio wave, *Lunar occultation, *Radio astronomy, *Radio source, *Star tracking, Astronomy, Extragalactic, Extraterrestrial, Flare, Instrumentation, Interferometer, Lunar, Occultation, Operation, Radiation, Radio, Source, Star, Tracking, Wave.

For abstract, see STAR 05 14.
N67-27012 HC$3.00 MF$0.65

AN ANALYTICAL APPROACH TO THE DETERMINATION OF STELLAR FIELDS OF VIEW.
National Aeronautics and Space Administration. Electronics Research Center, Cambridge, Mass.
R. A. Arehart, and L. A. Kleiman. Jun 67, 32p
NASA-TR-R-257
Contract 125-17-02-11

Descriptors: *Brightness, *Star field, *View factor, Analysis, Astronomy, Circle, Factor, Field, Magnitude, Number, Optics, Relation, Sensor, Size, Star, Stellar, Technology, View, Vision.

For abstract, see STAR 05 14.
N67-27261 HC$3.00 MF$0.65

CORONAL PHOTOGRAPHS, ISOPHOTES, AND A FLASH SPECTRUM FROM THE SOLAR ECLIPSE OF MAY 30, 1965.
National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
M. E. Henderson, S. M. Smith, and R. A. Torrey. Jun 67, 42p NASA-TN-D-4012
Contract 188-38-01-08-00-21

Descriptors: *Corona, *Isophote, *Photography, *Solar eclipse, Brightness, Convair cv-990 aircraft, Distribution, Eclipse, Flash, Instrumentation, Solar, Spectrum.

For abstract, see STAR 05 14.
N67-27285 HC$3.00 MF$0.65

LUNAR SURFACE STUDIES - A CONTINUING BIBLIOGRAPHY WITH INDEXES.
National Aeronautics and Space Administration, Washington, D. C.
Apr 67, 66p NASA-SP-7003/03/

Descriptors: *Bibliography, *Lunar surface, Abstract, Cartography, Geology, Index, Instrumentation, Lunar, Origin, Photography, Photometry, Spectrophotometry, Surface, Topography.

For abstract, see STAR 05 14.
N67-27297 HC$3.00 MF$0.65

MARTIAN IONOSPHERE - A COMPONENT DUE TO SOLAR PROTONS.
Smithsonian Astrophysical Observatory, Cambridge, Mass.
C. Sagan, and J. Veverka. Apr 67, 14p NASA-CR-84411, REPT.-703-24
Contract NGR-09-015-023

Descriptors: *Ionosphere, *Mars atmosphere, *Solar proton, Atmosphere, Component, Field, Ionization, Layer, Magnetic, Mariner iv space probe, Mars, Proton, Solar, Wind.

For abstract, see STAR 05 14.
N67-27370 HC$3.00 MF$0.65

A CRITICAL TEST OF THE ELECTRICAL DISCHARGE MODEL OF THE VENUS MICROWAVE EMISSION.
Smithsonian Astrophysical Observatory, Cambridge, Mass.
J. B. Pollack, and C. Sagan. Jan 67. 15p NASA-CR-84417, REPT.-612-8
Contract NGR-09-015-023

Descriptors: *Electric discharge, *Mathematical model, *Microwave radiation, *Venus, Cloud, Discharge, Electric, Emission, Hot surface, Interferometer, Mariner ii space probe, Mathematics, Microwave, Model, Radar, Radiation, Test, Water.

For abstract, see STAR 05 14.
N67-27376 HC$3.00 MF$0.65

DIRECTIONAL CHARACTERISTICS OF LUNAR THERMAL EMISSION.
Brown Engineering Co., Inc., Huntsville, Ala.
C. G. Montgomery, J. M. Saari, R. W. Shorthill, and N. F. Six, Jr. Nov 66, 96p NASA-CR-84449, D1-82-0568
Contract NAS8-20166
Prepared in Cooperation With Boeing Co., Seattle

Descriptors: *Infrared radiation, *Lunar luminescence, *Thermal emission, Brightness, Characteristic, Direction, Emission, Infrared, Luminescence, Lunar, Radiation, Reflection, Surface, Temperature, Terrain, Thermal.

For abstract, see STAR 05 14.
N67-27422 HC$3.00 MF$0.65

NEUTRON DIE-AWAY EXPERIMENT FOR LUNAR AND PLANETARY SURFACE ANALYSIS FINAL REPORT, 26 JUL. 1966 - 26 MAR. 1967.
Socony Mobil Oil Co., Inc., Dallas, Tex. Research Dept.
W. W. Givens, and W. R. Mills, Jr., 26 Apr 67, 120p NASA-CR-84447, CO-271-C-RES-/9-66/
Contract NASW-1435

Descriptors: *Gamma radiation, *Lunar composition, *Neutron decay, *Planetary surface, Analysis, Composition, Decay, Design, Experiment, Gamma, Lunar, Model, Neutron, Planetary, Pulse, Radiation, Rock, Soil, Surface.

For abstract, see STAR 05 14.
N67-27424 HC$3.00 MF$0.65

SCIENTIFIC OBJECTIVES OF DEEP SPACE INVESTIGATIONS - JUPITER AS AN OBJECT OF BIOLOGICAL INTEREST.
IIT Research Inst., Chicago, Ill. Astro Sciences Center.
May 67, 37p NASA-CR-84492, IITRI-P-19
Contract NASR-65/06/

Descriptors: *Biology, *Jupiter (planet), *Mission planning, Atmosphere, Effect, Environment, Evolution, Life, Mission, Origin, Planning, System, Terrestrial.

For abstract, see STAR 05 14.
N67-27647 HC$3.00 MF$0.65

A STUDY OF GALACTIC STRUCTURE IN CASSIOPEIA.
Uppsala Univ. (Sweden).
T. Oja. 1966, 7p

Descriptors: *Cassiopeia constellation, *Galaxy, *Milky way, *Spectrophotometry, *Star field, Absolute, Cassiopeia, Classification, Color, Constellation, Criterion, Field, Function, Intrinsic, Magnitude, Star, Structure.

For abstract, see STAR 05 14.
N67-27780 HC$3.00 MF$0.65

3C. CELESTIAL MECHANICS

SPACE REFERENCE SYSTEMS.
Aeronautical Chart and Information Center, St. Louis, Mo.
For primary bibliographic entry see Field 17G.
AD-644 222 HC$3.00 MF$0.65

AN ELEMENTARY DERIVATION OF THE PRINCIPAL EFFECTS OF THE OBLATENESS OF THE EARTH UPON THE ORBITS OF SATELLITES.
Technical rept. research paper,
Naval Postgraduate School Monterey Calif
John E. Brock. 27 Apr 67, 25p Rept no. TR/RP-76

Descriptors: (*Satellites (Artificial), *Orbital trajectories), Earth models, Celestial mechanics, Perturbation theory, Mathematical analysis.

General formulas for the first-order effects of the oblateness of the Earth upon the orbits of satellites were reported in 1957 by R. E. Roberson and by D. G. King-Hele. Their derivations employed methods which are unfamiliar to those not having studied the mathematics of astronomy. In this Technical Report/Research Paper No. 76, an elementary derivation is given for these useful and important results. (Author)
AD-653 078 HC$3.00 MF$0.65

THE 9.1-cm SPECTROHELIOGRAM OF MAY 20, 1966,
Stanford Univ Calif Radio Astronomy Inst
For primary bibliographic entry see Field 3B.
AD-653 352 Not available from CFSTI.

NEW METHODS OF CELESTIAL MECHANICS. VOLUME I - PERIODIC SOLUTIONS, THE NON-EXISTENCE OF INTEGRAL INVARIANTS, ASYMPTOTIC SOLUTIONS.
National Aeronautics and Space Administration, Washington, D. C.
H. Poincare. Apr 67, 337p NASA-TT-F-450
Transl. Into English of the Book "les Methodes Nouvelles de La Mecanique Celeste. Tome I. Solutions Periodiques, Non- Existence des Integrals Uniformes, Solutions Asymptotiques" New York, Dover Publ., 1957

Descriptors: *Approximation method, *Celestial mechanics, *Three-body problem, Approximation, Astronomy, Astrophysics, Body, Calculation, Celestial, Coordinate, Geometry, Integration, Mass, Mechanics, Method, Power, Problem, Three.

For abstract, see STAR 05 14.
N67-27277 HC$3.00 MF$0.65

NEW METHODS OF CELESTIAL MECHANICS. VOLUME II - METHODS OF NEWCOMB, GYLDEN, LINDSTEDT, AND BOHLIN.
National Aeronautics and Space Administration, Washington, D. C.
H. Poincare. Apr 67, 420p NASA-TT-F-451
Transl. Into English of the Book "les Methodes Nouvelles de La Mecanique Celeste, Tome Ii. les Methodes de Newcomb, Gylden, Lindstedt, Et Bohlin" New York, Dover Publ., 1957

Descriptors: *Astrophysics, *Celestial mechanics, *Mathematics, *Three-body problem, Body, Calculation, Celestial, Eccentricity, Libration, Mechanics, Method, Orbit, Perturbation, Planet, Problem, Secular, Three.

For abstract, see STAR 05 14.
N67-27278 HC$3.00 MF$0.65

NEW METHODS OF CELESTIAL MECHANICS. VOLUME III - INTEGRAL INVARIANTS, PERIODIC SOLUTIONS OF THE SECOND TYPE, DOUBLY ASYMPTOTIC SOLUTIONS.
National Aeronautics and Space Administration, Washington, D. C.
H. Poincare. Apr 67, 406p NASA-TT-F-452
Transl. Into English of the Book "les Methodes Nouvelles de La Mecanique Celeste. Tome Iii. Invariants Integraux. Solutions Periodiques Du Deuxieme Genre. Solutions Doublement Asymptotiques" New York, Dover Publ., 1957

Descriptors: *Celestial mechanics, *Integral function, *Invariance, *Three-body problem, Astronomy, Astrophysics, Body, Calculation, Celestial, Fluid, Focusing, Function, Integral, Kinetics, Mechanics, Motion, Poisson ratio, Problem, Solution, Stability, Three.

For abstract, see STAR 05 14.
N67-27279 HC$3.00 MF$0.65

4. ATMOSPHERIC SCIENCES

4A. ATMOSPHERIC PHYSICS

THE INFRARED TELLURIC ABSORPTION SPECTRUM INTRODUCTORY REPORT.
Environmental research papers no. 24,
Air Force Cambridge Research Labs., L. G. Hanscom Field, Mass.
J. N. Howard, and J. S. Garing. Jun 64, 44p
AFCRL-64-484

Descriptors: (*Infrared radiation, Absorption spectrum), (*Atmosphere, Infrared radiation), Band spectrum, Carbon dioxide, Carbon monoxide, Wate r vapor, Methane, Nitrogen compounds, Ozone, Simulation, Aerosols, Experimental data.

Recent work on the infrared transmission spectrum of the atmosphere of the earth is reviewed and discussed. The principal laboratory effort has been studied of absorption bands of CO2, H2O, CO, CH4, N2O and O3 in simulated atmospheres, in which nitrogen or oxygen is used as the foreign gas under controlled conditions of concentration, pressure and path length. Some recent open air studies from balloons and high altitude aircraft are described, and the principal techniques of estimating open air slant path transmission from the laboratory data are described. (Author)
AD-444 660 HC$3.00

EARLY RESULTS FROM THE TOPSIDE SOUNDER IN THE ALOUETTE II SATELLITE,
Defence Research Telecommunications Establishment Ottawa (Ontario) Radio Physics Lab
G. L. Nelms, and G. E. K. Lockwood. 1966, 20p
Availability: Published in Space Research v7 p604-23 1966.

Descriptors: (*Scientific satellites, Experimental data), (*Upper atmosphere, Scientific research), Electron density, Temperature, Ionosphere, Plasma medium, Polar regions, Canada.
Identifiers: Alouette two.

The Alouette II satellite was launched on 29 November 1965 into an 80 degree inclination elliptical orbit, with apogee of 3000 km and perigee of 500 km. The satellite contains 5 experiments; this paper describes some of the early results from the sweep frequency topside sounder experiment.
AD-652 759 Not available from CFSTI.

THE GENERAL PATTERN OF AURORAL PARTICLE PRECIPITATION,
Defence Research Telecommunications Establishment Ottawa (Ontario)
T. R. Hartz, and N. M. Brice. 20 Sep 66, 30p
Prepared in cooperation with Carleton Univ., Ottawa (Ontario).
Availability: Published in Planet. Space Sci. v15 p301-29 1967.

Descriptors: (*Aurorae, Ionospheric disturbances), (*Upper atmosphere, Aurorae), Statistical data, Electromagnetic wave reflections, Radio waves, Electrons, Northern hemisphere, Magnetosphere, Atmosphere models, Particles, Diurnal variations.

Gross statistical data on optical- and radio-auroral phenomena are examined to establish the latitude-versus-time pattern for the causal particle precipitation. Although these phenomena may occur at any time of day at auroral-zone latitudes, they are shown to occur most frequently at about 08 and 22 hours geomagnetic time. These two dominant diurnal maxima exhibit radically different characteristics, indicating that two distinct particle populations are involved on the average. Further, the two types of precipitation are recognizable at other times of day in the statistical data, although at a reduced intensity, leading to a two-zoned precipitation pattern in which there is a clear separation between the zones during most of the day. The most prominent features of the precipitation in the zone with the night-time maximum are shown to be the impulsive character of the precipitation and its steep energy spectrum, whereas the zone with the morning maximum is best described as having a continuous influx with a much flatter particle spectrum. On the basis of detailed studies of these characteristics, of observations on other related ionospheric parameters, and of direct particle measurements made with rockets and satellites it seems plausible to associate the two particle populations with different regions of the magnetosphere. This relationship to the magnetospheric structure and to the processes therein is discussed for both the 'splash' and 'drizzle' types of precipitation . (Author)
AD-652 760 Not available from CFSTI.

ARE YOUNG GALAXIES VISIBLE. II. THE INTEGRATED BACKGROUND,
Princeton Univ N J Palmer Physical Lab
For primary bibliographic entry see Field 3A.
AD-652 777 Not available from CFSTI.

ISOTROPY AND HOMOGENEITY OF THE UNIVERSE FROM MEASUREMENTS OF THE COSMIC MICROWAVE BACKGROUND.
Technical rept.,
Princeton Univ N J Palmer Physical Lab
R. B. Partridge, and David T. Wilkinson. 2 Mar 67, 4p
Contract Nonr-1858 (30)
Research supported in part by NSF.
Availability: Published in Physical Review Letters v18 n14 p557-9 Apr 3 1967.

Descriptors: (*Cosmic rays, Anisotropy), Blackbody radiation, Radiometers, Diurnal variations, Microwaves, Astrophysics, Temperature.

A Dicke radiometer (3.2-cm wavelength) was used to make daily scans near the celestial equator to look for possible anisotropy in the cosmic blackbody radiation. After about one year of interm itent operation we find no 24-h asymmetry with an amplitude greater than plus or minus 0.1% (of 3K). There is, however, a possibly significant 12-h anisotropy with an amplitude of about 0.2%. (Author)
AD-652 779 Not available from CFSTI.

NUMERICAL SIMULATION OF CUMULUS CONVECTION,
Rand Corp Santa Monica Calif
For primary bibliographic entry see Field 4B.
AD-652 812 HC$3.00 MF$0.65

CONSIDERATIONS OF EXPECTED AURORAL INTENSITIES,
Northeastern Univ Boston Mass
Basil L. Cochrun. 28 Feb 67, 13p Rept no. Scientific-2
AFCRL-67-0210
Contract AF 19 (628)-3876

Descriptors:(*Aurorae, Sky brightness), (*Rocket research, Aurorae), Scientific research, Polar regions, Canada, Airglow, Brightness, Sounding rockets.

Using luminosity profiles and graphical integration, curves of normalized intensity versus height are obtained for arc, ray and drapery type aurorae for the 5577 (01), 6300 (01) and 4278 (N+2) (0-1) emissions. (Author)
AD-652 855 HC$3.00 MF$0.65

PEARL TYPE TELLURIC CURRENT MICROPULSATIONS AT COLLEGE.
Alaska Univ College Geophysical Inst
For primary bibliographic entry see Field 8N.
AD-652 858 Not available from CFSTI.

THE EFFECT OF TOPOGRAPHY AND GEOLOGY ON TELLURIC CURRENTS.
Alaska Univ College Geophysical Inst
For primary bibliographic entry see Field 8N.
AD-652 859 Not available from CFSTI.

TELLURIC CURRENT MICROPULSATION BURSTS,
Alaska Univ College Geophysical Inst
For primary bibliographic entry see Field 8N.
AD-652 860 Not available from CFSTI.

AURORAL-ZONE TELLURIC-CURRENT MICROPULSATIONS T LESS THAN 20 SECONDS.
Alaska Univ College Geophysical Inst
For primary bibliographic entry see Field 8N.
AD-652 861 Not available from CFSTI.

PERIODIC COVARIATION OF RADIOWAVE ABSORPTION, EARTH CURRENTS AND OTHER ASSOCIATED PHENOMENA IN THE AURORAL ZONE.
Alaska Univ College Geophysical Inst
For primary bibliographic entry see Field 8N.
AD-652 862 Not available from CFSTI.

PEARL-TYPE MICROPULSATIONS ASSOCIATED WITH MAGNETIC STORM SUDDEN COMMENCEMENTS.
Alaska Univ College Geophysical Inst
For primary bibliographic entry see Field 8N.
AD-652 863 Not available from CFSTI.

INTRA- AND INTERHEMISPHERE DIFFERENCES IN OCCURRENCE TIMES OF HYDROMAGNETIC EMISSIONS.
Alaska Univ College Geophysical Inst
For primary bibliographic entry see Field 8N.
AD-652 864 Not available from CFSTI.

EVENING MICROPULSATION EVENTS WITH A RISING MIDFREQUENCY CHARACTERISTIC,
Alaska Univ College Geophysical Inst
For primary bibliographic entry see Field 8N.
AD-652 865 Not available from CFSTI.

SPATIAL DISTRIBUTION OF ENERGETIC ELECTRONS IN THE GEOMAGNETIC TAIL.
Revised ed.,
Chicago Univ Ill Enrico Fermi Inst for Nuclear Studies
Takashi Murayama. 1 Aug 66, 11p
AFOSR-67-1199
Contracts AF 49 (638)-1642, AF 19 (628)-2473
Research supported in part by NASA. Revision of manuscript submitted 29 Jun 66.
Availability: Published in Journal of Geophysical Research v71 n23 p5547-57 Dec 1 1966.

Descriptors: (*Electrons, *Magnetosphere), (*Scientific satellites, Experimental data), Cosmic rays, Correlation techniques, Magnetic fields, Particle trajectories, Solar radiation, Protons, Cosmic ray telescopes.
Identifiers: Magnetosheath.

Counting rates from a solid-state detector in the experiment of Fan, Gloeckler, and Simpson on the IMP I satellite have been analyzed to investigate the spatial distribution of electrons with energies > 30 kev in the geomagnetic tail and in the magnetosheath region surrounding the tail out to about 30 earth radii. A multiple correlation analysis was made to investigate the spatial distribution of the electrons. Results are given. The implications of these observations are discussed mainly in connection with the origin of the energetic electrons in the tail.
AD-652 950 Not available from CFSTI.

CONTRIBUTIONS FROM THE CLOUD PHYSICS LABORATORY,
Washington Univ Seattle Dept of Atmospheric Sciences
P. V. Hobbs, D. A. Burrows, W. D. Scott, and A. J. Kezweeny. 7 Jun 66, 24p
Grant NSF-GP-3809
Includes reprints.
Availability: Published in Various journals.

Descriptors: (*Ice, *Atmospheric electricity), (*Sulfates, *Air pollution), (*Water, Drop testing), Hail, Clouds, Thunderstorms, Meteorological phenomena, Spheres, Ammonia, Reaction kinetics, Charged particles, Experimental data, Scientific research.

Contents: The electrification of an ice sphere moving through natural clouds; the formation of sulfate in water droplets; splashing of a water drop; the charging of ice spheres due to collisions with snowflakes.
AD-652 969 Not available from CFSTI.

SOME APPLICATIONS OF WIND TO UNGUIDED ROCKET IMPACT PREDICTIONS,
Atmospheric Sciences Lab White Sands Missile Range N Mex
Edward M. D'Arcy. Mar 67, 25p
ECOM-5112

Descriptors: (*Atmospheric sounding, *Wind), (*Sounding rockets, Impact), Mathematical prediction, Thickness, Real time, Digital computers, Rocket trajectories.

The report discusses the maximum layer thickness to be used in a real-time system where the maximization results in the minimization of digital computer core storage usage but delivers the desired accuracy. Results show that small layers, on the order of the size of the rocket, need to be used in the first portion of the wind profile but can expand to quite large thicknesses at the top of the profile. The effect of winds encountered by an unguided rocket on the re-entry leg of its trajectory and the effect of winds above 100 thousand feet are discussed. Results show that winds on re-entry are never needed above 100,000 feet and only rarely below. Winds above 100,000 feet should be used if the burnout altitude of the rocket is above 100,000 feet. (Author)
AD-653 001 HC$3.00 MF$0.65

OPERATION MANUAL FOR STRATOSPHERE TEMPERATURE SONDE,
Atmospheric Sciences Lab White Sands Missile Range N Mex
Bruce Kennedy. Mar 67, 23p
ECOM-5114

Descriptors: (*Atmospheric sounding, Temperature), (*Sounding rockets, Stratosphere), (*Instruction manuals, Atmospheric sounding), Telemeter systems, Radiosondes, Thermistors, Calibration, Power supplies.
Identifiers: AN/TMQ-5.

This report provides instructions for the operation of the Stratosphere Temperature Sonde. (Author)
AD-653 003 HC$3.00 MF$0.65

A COMPARISON OF PIBAL WITH RAOB AND RAWIN WIND MEASUREMENTS,
Atmospheric Sciences Lab White Sands Missile Range N Mex
L. J. Rider. Apr 67, 25p
ECOM-5116

Descriptors: (*Wind, Velocity), Radiosondes, Meteorological balloons, Measurement.

An empirical study of the time and space variability of winds measured by triple-theodolite pilot balloon observations (pibals) compared with radiosonde (raob) and rawinsonde wind measurements at Green River, Utah, during the months of September 1965, and June, July, and August 1966, is presented. Pibal and rawin wind measurements at 500-foot intervals from 1000 to 10,000 feet were compared with radiosonde winds, and from 6500 to 10,000 feet pibal and rawin winds were compared. Absolute mean wind direction differences decreased from 22 degrees at 1000 feet to 9 degrees at 5500 feet, and from 10 degrees at 6500 feet to 5.5 degrees at 10,000 feet. A negative bias of 9 and 8 degrees was evident at the 1000 and 1500-foot levels, respectively. Absolute mean wind speed differences ranged from 2.75 m/sec at 1000 feet to 1.5 m/sec at 3500 feet and approximately 1.0 m/sec at all levels above. Mean pibal wind speeds were greater than the raob measurements at all levels, ranging from 2.6 m/sec at 1000 feet to 1.1 m/sec at 2500 feet and near 0.5 m/sec from 3000 to 5500 feet. No significant bias between the pibal and rawin speeds was indicated. (Author)
AD-653 004 HC$3.00 MF$0.65

THE D-REGION FAIR-WEATHER ELECTRIC FIELD,
Atmospheric Sciences Lab White Sands Missile Range N Mex
Willis L. Webb, and Max C. Bolen. Apr 67, 26p
ECOM-5120

Descriptors: (*Electric fields, *Upper atmosphere), Magnetic fields, Electromagnetism, Mesosphere, Solar radiation, Atmosphere models, Diurnal variations, Ionosphere, Atmospheric electricity, Magnetohydrodynamics, Atmospheric motion, Stratosphere.

Motion of a slightly ionized medium such as the earth's lower ionosphere through a magnetic field such as the earth's permanent magnetic field will result in systematic separation of electrical charges. This charge separation will result in development of an opposing electric field which will balance, in the average case, the force produced by the interaction of the motion and the magnetic field. The D-region fair-weather electric field is defined as the equilibrium field produced by the mean circulation. Asymmetries between the earth's geomagnetic and rotational axes and the structure of the stratospheric circulation are considered in determining global and annual structures of the D-region fair-weather electric field. (Author)
AD-653 006 HC$3.00 MF$0.65

RADAR ANGELS AND ATMOSPHERIC CONVECTION IN ARIZONA.
Army Electronics Command Fort Huachuca Ariz Research Div
For primary bibliographic entry see Field 17I.
AD-653 014 HC$3.00 MF$0.65

DERIVATION OF HYPERBOLIC TURBULENT DIFFUSION EQUATION.
Army Electronics Command Fort Huachuca Ariz Research Div
For primary bibliographic entry see Field 20D.
AD-653 015 HC$3.00 MF$0.65

ACOUSTICAL AND METEOROLOGICAL DATA REPORT. SOTRAN I AND II.,
Atmospheric Sciences Lab White Sands Missile Range N Mex
R. D. H. Low, W. R. Nordquist, J. W. Coffman, A. H. Breeland, Jr., and Ricardo Pena. Nov 66, 253p
ECOM-5094
Original contains color, reproducible in black/white only.

Descriptors: (*Sound transmission, Atmosphere), (*Atmosphere, Acoustic properties), Meteorological parameters, Upper atmosphere, Wind, Explosions, Seismological stations, Experimental data, Sounding rockets, Monitors.
Identifiers: Sotran project, Infrasound.

Meteorological and acoustical data acquired from SOTRAN I and II are presented. The monitoring sites, instrumentation, and field operations are described. (Author)
AD-653 017 HC$3.00 MF$0.65

ON THE SCIENTIFIC USE OF A SATELLITE RADAR SYSTEM.
Memorandum rept.,
Naval Research Lab Washington D C
S. J. Rutiser, and J. M. Goodman. Apr 67, 44p
Rept no. NRL-MR-1768

Descriptors: (*Satellite networks, *Radar), (*Ionospheric disturbances, Scientific satellites), Magnetic fields, Magneto-optic effect, Aurorae, Meteors, Upper atmosphere, Wind.
Identifiers: Faraday rotation.

The possible scientific uses of a satellite radar system are evaluated and several experiments are discussed. Synoptic studies of field-aligned ionization associated with radio aurora, the detection of shower meteors, and further investigation of the ionospheric electron content with such a system appear to show considerable promise. The study of satellite precursors and wakes might also be accomplished by a satellite radar system employing a radar frequency in the neighborhood of 30 MHz. The same radar frequency would also be advantageous for the meteor and auroral investigations. In view of their significance in field-aligned ionization studies, the transverse propagation angle contours have been computed at specified latitudes along a given meridian. These contours are used to predict the radar beam orientations for which certain field-aligned phenomena might be observed. (Author)
AD-653 065 HC$3.00 MF$0.65

IONOSPHERIC RESEARCH.
Quarterly progress rept. no. 13, 1 Oct-31 Dec 66, Illinois Univ Urbana Electrical Engineering Research Lab
H. D. Webb. Jan 67, 93p
Contract DA-36-039-AMC-03703 (E)
See also AD-647 423.

Descriptors: (*Ionosphere, Scientific research), (*Moon, Reflection), Theses, Extraterrestrial topography, Signals, Solar flares, Electrons, Recording systems, Servo amplifiers, Antennas.
Identifiers: Faraday rotation.

Moon reflected signals were received at 150.6 mc on 30 days for 204 hours of operation and at 413.25 mc on 29 days for 56 hours of operation. Most of the days were magnetically quiet. There were importance 2 flares on some of the days. The receiving station may be operated automatically on 150.6 mc. A thesis for the M.S. degree which gives details of the automatic operation is appended. The ratio of the topside to bottomside ionospheric electron content is being calculated for October 1965 using Ft. Monmouth ionograms and lunar reflection data. Volume IV of the Atlas of Lunar Data, for observation days from January 1 through December 31, 1965 has been distributed. Signals from the stationary satellite ATS-1 have been successfully received and recorded on two frequencies near 136 mc. (Author)
AD-653 160 HC$3.00 MF$0.65

RECORDING SPECTROPHOTOMETER FOR GROUND AND BALLOON MEASUREMENTS OF THE BRIGHTNESS OF THE DAYTIME SKY,
American Meteorological Society Boston Mass
N. M. Gopshtein, and V. T. Kushpil. Apr 67, 13p Rept no. T-R-608
TT-67-62071
Contract AF 19 (628)-3880
Registriruyushchii Spektrofotometr dlya Nazemnykh i Aerostatnykh Izmerenii Yarkosti Dneynogo Neba, trans. of Glavnaya Geofizicheskaya Observatoriya, Leningrad. Trudy (USSR), n170 p149-55 1965.

Descriptors: (*Spectrophotometers, *Measurement), (*Balloons, Measurement), (*Sky brightness, Measurement), Instrumentation, Calibration, Band spectrum, USSR.

A detailed description is given of an instrument for measuring the brightness of the sky in the 0.58 to 1.87 microns region of the spectrum at heights up to 30 km. The calibration of the instrument and techniques for analysis of the measurements are also described. (Author)
AD-653 167 HC$3.00 MF$0.65

GROUND MEASUREMENTS OF THE ANGULAR DISTRIBUTION AND SPECTRAL COMPOSITION OF DIFFUSE SKY RADIATION,
American Meteorological Society Boston Mass
V. I. Kushpil. Apr 67, 19p Rept no. T-R-609
TT-67-62072
Contract AF 19 (628)-3880
Nazemne Izmereniya Uglovogo Raspredeleniya i Spektralnogo Sostava Rasseyannoi Radyatsii Neba, trans. of Glavnaya Geofizicheskaya Observatoriya, Leningrad. Trudy (USSR). n170 p156-66 1965.

Descriptors: (*Sky brightness, *Measurement), Spectrophotometers, Scattering, Atmosphere, Intensity, Band spectrum, Solar radiation, Tables, USSR.

The results of ground measurements of the sky brightness are cited for the spectral region 0.58 to 1.87 microns with various scattering angles and compared with data in the literature. (Author)
AD-653 168 HC$3.00 MF$0.65

INTENSITY OF RADIATION FROM AUREOLE UNDER STANDARD CONDITIONS,
American Meteorological Society Boston Mass
G. L. Shubova. Apr 67, 8p Rept no. T-R-610
TT-67-62073
Contract AF 19 (628)-3880
Intensivnost Okolosolnechnoi Radyatsii v Standartnykh Usloviyakh, trans. of Glavnaya Geofizicheskaya Observatoriya, Leningrad. Trudy (USSR), n170 p188-91 1965.

Descriptors: (*Sky brightness, *Sun), Solar radiation, Atmosphere, Errors, Instrumentation, Equations, Intensity, Tables.

The intensity of radiation from aureole is estimated for standard conditions. The radiant intensity of radiation from sunward is studied as a function of the mass of the atmsophere and of the surface albedo. (Author)
AD-653 169 HC$3.00 MF$0.65

SEPARATE MEASUREMENT OF UPWARD AND DOWNWARD RADIATION FLUXES,
American Meteorological Society Boston Mass
L. Z. Prokh. Apr 67, 12p Rept no. T-R-565
TT-67-62074
Contract AF 19 (628)-3880
O Razdelnom Izmerenii Voskhodyashchego i Niskhodyashchego Potokov Radyatsii, trans. of Ukrainskii Nauchno-Issledovatelskii Gidro-Meteorologicheskii Institut. Trudy (USSR), n48 p107-12 1965.

Descriptors: (*Heat flux, *Measurement), Instrumentation, Thermal radiation, Atmosphere, Design, Fog, Sensitivity, Portable, Absorption, Errors, Copper, Wire, Thermistors, Surface properties, Heat transfer, Blackbody radiation, Solar radiation, Equations.

An instrument (double pyrgeometer) designed for separate measurement of upward and downward radiation fluxes is described. The radiation receivers are standard Yanishevsky balancemeters exposed to forced air. (Author)
AD-653 170 HC$3.00 MF$0.65

RELATION BETWEEN THE NUMBER OF THUNDERSTORMS AND THE AMOUNT OF SFERICS THAT PRODUCE A FIELD STRENGTH GREATER THAN A GIVEN LEVEL,
American Meteorological Society Boston Mass
K. N. Barkalova. Apr 67, 6p Rept no. T-R-574
TT-67-62076
Contract AF 19 (628)-3880
Svyaz Mezhdu Kolichestvom groz i Chislom Atmosfernykh Pomekh Sozdayaushchikh Napryazhennost Polya Vyshe Zadannogo Urovnya, trans. of Glavnaya Geofizicheskaya Observatoriya, Leningrad. Trudy (USSR), n157 (219) p85-6 1964.

Descriptors: (*Atmmospherics, Sources), (*Thunderstorms, Electric fields), Meteorological phenomena, Meteorological charts, Russia.

The relation between the number of thunderstorms over the Europenn continent and the amount of sferics that create a field strength greater thnn a given level is examined. The sferics were recorded in Voyeykovo and Odessa. (Author)
AD-653 172 HC$3.00 MF$0.65

EXPLANATION OF THE CAUSES OF NON-CORRESPONDENCES OF SFERICS CENTERS AND WEATHER CONDITIONS,
American Meteorological Society Boston Mass
N. I. Leushin. Apr 67, 18p Rept no. T-R-573
TT-67-62077
Contract AF 19 (628)-3880
Vyyasnenie Prichin Nesootvetstviya Ochagov Atmosferikov s Pogodnymi, trans. of Glavnaya Geofizicheskaya Observatoriya, Leningrad. Trudy (USSR), n157 (219) p76-84 1964.

Descriptors: (*Atmospherics, Sources), (*Thunderstorms, Atmospherics), Meteorological charts, Meteorological phenomena, Tracking, Lightning, Accuracy, Weatherstations, Russia.

Data of 1962 were used to calculate the percentage of sferics centers confirmed by weather conditions with respect to the total number of centers detected by radio direction finders, as a function of the level of activity of the centers and their distance from the direction-finding stations. (Author)
AD-653 173 HC$3.00 MF$0.65

THE INFRARED ABSORPTION BANDS OF OZONE,
Ohio State Univ Research Foundation Columbus
David J. McCaa, and John H. Shaw. Feb 67, 105p
Rept no. Scientific-2
AFCRL-67-0237
Contract AF 19 (628)-3806

Descriptors: (*Ozone, Absorption spectrum), (*Spectra (Infrared), Ozone), (*Thermal radiation, Atmosphere), Stratosphere, Infrared mdiation, Band spectrum, Statistical analysis, Experimental data, Spectrophotometers.

Fourteen bands of ozone between 500 and 3300 per cm have been identified and values of the vibrational anharmonic constants determined. The integrated band absorptances of many of these bands have been measured from spectra of a 32 m path of ozone-oxygen mixtures containing up to 30 atm cm O3 near 25C. The dependences of the band absorptances on O3 concentration and total pressure are described and the strengths of nine of the bands are given. It is shown that the statistical band model describes the behavior of the bands reasonably well for the ranges of experimental variables used. (Author)
AD-653 195 HC$3.00 MF$0.65

A METHOD FOR FITTING LINEARLY SEGMENTED MULTI-LAYER ATMOSPHERIC MODELS TO AN ARBITRARY SET OF UPPER AND LOWER BOUNDARY CONDITIONS,
Gca Corp Bedford Mass Gca Technology Div
R. A. Minzner. Mar 67, 24p Rept no. Scientific-4, GCA-TR-67-6-A
AFCRL-67-0198
Contract AF 19 (628)-6085

Descriptors: (*Atmosphere models, Synthesis), Linear systems, Altitu , Density, Atmospheric temperature.

Any set of temperature, pressure and density values which are realistic for one altitude can be exactly connected to another set of temperature, pressure and density values at a second altitude, with a model atmosphere defined by the appropriate linearly segmented two-layer temperature-altitude profile provided one of these layers is isothermal and the second is a nonzero constant gradient of tempemture with respect to height. The altitude comprising the intersection of the two segments of the required temperature-altitude profile is determined mathematically. The method for generating two-layer models is applied to the generation of three-layer and four-layer models. (Author)
AD-653 203 HC$3.00 MF$0.65

DETERMINATION OF PARTIAL PHOTOIONIZATION CROSS SECTIONS BY PHOTOELECTRON SPECTROSCOPY
Adelaide Univ (Australia) Dept of Physics
For primary bibliographic entry see Field 7E.
AD-653 214 HC$3.00 MF$0.65

THE HELIOCENTRIC INTENSITY GRADIENTS OF COSMIC-RAY PROTONS AND HELIUM DURING MINIMUN SOLAR MODULATION,
Chicago Univ Ill Enrico Fermi Inst for Nuclear Studies
For primary bibliographic entry see Field 3B.
AD-653 240 Not available from CFSTI.

SOLUTION OF THE RESTRICTED PROBLEM OF THREE BODIES BY POWER SERIES,
Yale Univ New Haven Conn Observatory
For primary bibliographic entry see Field 20K.
AD-653 301 Not available from CFSTI.

ON THE MAGNETOSPHERES OF SELF-GRAVITATING BODIES,
Columbia Univ New York Dept of Astronomy
For primary bibliographic entry see Field 20H.
AD-653 324 Not available from CFSTI.

LOW ENERGY HEAVY PRIMARY PARTICLES IN COSMIC RADIATION,
Lund Univ (Sweden) Dept of Physics
L. Malmqvist. Sep 66, 10p
AFOSR-67-1285
Grant AF-EOAR-35-66
Availability: Published in Arkiv foer Fysik v34 n3 p33-8 1967.

Descriptors: (*Cosmic rays, Distribution), Charged particles, Electrostatics, Energy, Photographic emulsions, Particle trajectories, Nucleons, Upper atmosphere, Sweden.
Identifiers: Nuclear emulsions.

Charge and energy spectra of the low energy heavy primary particles in cosmic radiation were studied in a nuclear emulsion stack which was exposed at 2.7 g/sq. cm. of residual atmosphere, at Fort Churchill, on July 28, 1963. Photometric identification measurements were made on 114 tracks of stopping heavy primary particles. In the energy range 150-250 MeV per nucleon the L/M-ratio was found to be 0.38 plus or minus 0.13. The differential flux values observed are given. These values are in agreement with those found in other investigations made in the summer of 1963. (Author)
AD-653 355 Not available from CFSTI.

A LATITUDE SURVEY OF THE EQUATORIAL ELECTROJET WITH ROCKET-BORNE MAGNETOMETERS.
National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
K. Burrows, T. N. Davis, and J. D. Stolarik. Jul 66, 48p NASA-TM-X-55787, X-612-66-334

Descriptors: *Equatorial electrojet, *Magnetometer, *Rocket sounding, Boundary, Conductivity, Current, Density, Determination, Electrojet, Equator, Gradient, Latitude, Layer, Measurement, Rocket, Rubidium, Sounding, Vapor.

For abstract, see STAR 05 14.
N67-27563 HC$3.00 MF$0.65

HIGH LATITUDE GEOPHYSICAL DATA, OCTOBER- DECEMBER 1966.
Alaska Univ., College. Geophysical Inst.
V. P. Hessler. Dec 66, 111p NASA-CR-84491, UAG-C-46
Contract NAS5-3595

Descriptors: *Geophysics, *Graph, *Ionosphere, *Polar region, *Table, Activity, Cosmic, Data, Frequency, High latitude, Level, Noise, Polar, Region, Telluric current, Telluric-current micropulsation, Time.

For abstract, see STAR 05 14.
N67-27646 HC$3.00 MF$0.65

HIGH LATITUDE GEOPHYSICAL DATA, JULY-SEPTEMBER 1966.
Alaska Univ., College. Geophysical Inst.
V. P. Hessler. Sep 66, 112p NASA-CR-84494, UAG-C-45
Contract NAS5-3595

Descriptors: *Geophysics, *Graph, *Ionosphere, *Polar region, *Table, Activity, Cosmic, Current, Data, Geomagnetic, High latitude, Noise, Polar, Region, Telluric-current micropulsation.

For abstract, see STAR 05 14.
N67-27648 HC$3.00 MF$0.65

ON ATMOSPHERIC SIMULATION: A COLLOQUIUM.
Technical notes,
National Center for Atmospheric Research, Boulder, Colo.
G. M. Hidy. Nov 66, 269p NCAR-TN-22
Research supported in part by NSF.

Descriptors: (*Atmosphere, Simulation), (*Test facilities, Meteorology), (*Meteorological parameters, Simulation), Symposia, Clouds, Turbulence, Wind tunnels, Fluid mechanics, Atmospheric motion, Planetary atmospheres, Laboratories, Airborne, Plasma physics, Upper atmosphere, Meteorological instruments, Bibliographies.

Contents: Basic considerations in simulating atmospheric processes; Atmospheric simulation: Progress and prospects; (Molecular and near-molecular scale phenomena; Microscale processes; Mesoscale phenomena; Continental and planetary scale phenomena); On the question of a national program in simulation (An aircraft instrumentation test chamber, A research program for laboratory cloud physics, A program for studying the aerodynamics over mountainous terrain, Data processing equipment, Geophysical fluid dynamics and plasma physics, A new wind tunnel program for investigating features of turbulent shearing flow in stratified media), Lectures and discussions of the participants in the colloquium (20 papers); Discussion of a test chamber for aircraft instrumentation; Bibliography.
PB-173 777 HC$3.00 MF$0.65

4B. METEOROLOGY

THE DEVELOPMENT OF A WATER-SURFACE BURST FALLOUT MODEL: THE RISE AND EXPANSION OF THE ATOMIC CLOUD,
Naval Radiological Defense Lab., San Francisco, Calif.
For primary bibliographic entry see Field 15F.
AD-441 983 HC$3.00

THE INFRARED TELLURIC ABSORPTION SPECTRUM INTRODUCTORY REPORT.
Air Force Cambridge Research Labs., L. G. Hanscom Field, Mass.
For primary bibliographic entry see Field 4A.
AD-444 660 HC$3.00

FLIGHT OBSERVATIONS OF ATMOSPHERIC TURBULENCE.
Final rept.,
Eastern Air Lines, Inc., Miami, Fla. Metecrology Dept.
Paul W. Kadlec. Jun 66, 54p
SRDS-RD-66-72
Contract FA-66-WA-1449

Descriptors: (*Atmospheric motion, *Aviation safety), Scintillation counters, Vortices, Airborne, Visual inspection, Meteorology, Meteorological parameters.

Recognizing impending flight conditions from the observation of sky conditions and cockpit instruments can assist flight crews in determining the appropriate courre of action to insure a safe and comfortable flight. A summary of observations is provided from the analysis of data collected on 963 flights by a research meteorologist riding in the cockpit of airline and military jet aircraft. Flight conditions in clear skies may often be anticipated when related to certain tropopause and jet stream configurations. Three cloud pattern models are described that associate cirrus formed by jet streams with areas of occurrence of significant turbulence. A refinement in the theory that atmospheric temperature changes may indicate clear air turbulence indicates that a rate of temperature change of 1.0C per minute with a total change of 2.0C is the most effective combination for detecting impending significant turbulence. Clear air vor-

tices that form below the base of severe thunderstorms may produce turbulence capable of upsetting multi-engine jet aircraft. The formation of these vortices occurs in the precipitation-free area of the thunderstorm. An airborne portable scintillometer was flight tested to determine the feasibility of detecting clear air turbulence by means of aircraft optical observations. The equipment and observational procedures used in collecting data for analysis are also described. (Author)
AD-643 554 HC$3.00 MF$0.65

RESEARCH ON TROPICAL RAINFALL PATTERNS AND ASSOCIATED MESOSCALE SYSTEMS.
Semi-annual rept. no. 1, Sep 66-Feb 67,
Texas A and M Univ College Station Dept of Meteorology
Walter K. Henry, John F. Griffiths, L. Glen Cobb, and Mauro Coligado. Apr 67. 157p Rept no. Ref-67-2-T
ECOM-02313-S1
Contract DA-28-043-AMC-02313 (E)

Descriptors: (*Rainfall, *Tropical regions), British Guiana, Colombia, South America, Statistical analysis, Philippines, Atmospheric precipitation, Meteorological phenomena, Storms.

A study is initiated of some aspects of rainfall in Guyana. The discussion includes the seasonal changes of rainfall and especially the variations of rainfall, along with an analysis of the coefficient of association of rainfall across the area. The work concerning the monthly precipitation changes was extended to tropical South America and has brought to light some of the inherent synoptic patterns associated with the rainfall changes. Work has begun on a study of the maximum 24-hour precipitation amounts, using the statistical theory of extreme value analysis. Preliminary results have been most encouraging. A heavy rain storm which caused flooding in Bogota, Colombia occurred on 17 April 1965. A network of recording mingages make it possible to study cause of development, movement and rainfall intensities over five minute periods. (Author)
AD-652 702 HC$3.00 MF$0.65

SEASONAL CHANGE REVEALED BY TIME-LAPSE PHOTOGRAPHY.
Army Natick Labs Mass Earth Sciences Div
For primary bibliographic entry see Field 8F.
AD-652 732 HC$3.00 MF$0.65

NUMERICAL SIMULATION OF CUMULUS CONVECTION,
Rand Corp Santa Monica Calif
F. W. Murray. Apr 67. 41p Rept no. RM-5316-NRL
Contract N0014-67-C-0101

Descriptors: (*Convection (Atmospheric), Models (Simulations)), (*Cumulus clouds, *Atmosphere models), Hydrodynamics, Thermodynamics, Atmosphere, Numerical methods and procedures, Weather forecasting, Clouds, Dew point, Meteorological parameters, Meteorological phenomena.
Identifiers: Weather modification.

Atmospheric thermal convection, including condensation and evaporation, is modeled on the cumulus scale by numerically solving the equations of hydrodynamics and thermodynamics. Appropriate finite-difference equations are derived for both axial and rectilinear symmetry and for two differencing schemes. A mixed Euler-Lagrange method is used. A specific example is discussed, and its computational results are compared with observations made from instrumented aircraft of the Naval Research Laboratory. It is concluded that the model is realistic in many respects, and that it could be a useful adjunct for research in cloud dynamics and cloud physics, particularly in the field of weather modification. (Author)
AD-652 812 HC$3.00 MF$0.65

RADAR PRECIPITATION ECHOES. EXPERIMENTS ON TEMPORAL, SPATIAL, AND FREQUENCY CORRELATION.
Johns Hopkins Univ Silver Spring Md Applied Physics Lab
For primary bibliographic entry see Field 17I.
AD-652 818 HC$3.00 MF$0.65

ON THE THEORY OF WIND MEASUREMENT WITH INCOHERENT RADAR,
Northeastern Univ Boston Mass Dept of Electrical Engineering
For primary bibliographic entry see Field 17I.
AD-652 857 HC$3.00 MF$0.65

MONTHLY MICROCLIMATIC SUMMARY, SEPTEMBER 1966: ENVIRONMENTAL DATA BASE FOR REGIONAL STUDIES IN THE HUMID TROPICS,
Army Tropic Test Center Fort Clayton Canal Zone
Michael A. Fradel, and Wilfried H. Portig. Nov 66. 28p
ARPA Order-740
See also AD-647 823.

Descriptors: (*Tropical regions, Panama), (*Climatology, Tropical regions), Humidity, Atmospheric temperature, Barometric pressure, Rainfall, Wind, Evaporation, Data.

The report contains detailed microclimatic data for September 1966 from specific sites in the Panama Canal Zone and vicinity. The data are presented in tabular form, summarized for hourly and/or daily observations from surface to 46-meter levels. Elements listed are: temperature, pressure, precipitation, wind speed and direction, relative humidity, and evaporation. (Author)
AD-652 886 HC$3.00 MF$0.65

CONTRIBUTIONS FROM THE CLOUD PHYSICS LABORATORY,
Washington Univ Seattle Dept of Atmospheric Sciences
For primary bibliographic entry see Field 4A.
AD-652 969 Not available from CFSTI.

SOME APPLICATIONS OF WIND TO UNGUIDED ROCKET IMPACT PREDICTIONS,
Atmospheric Sciences Lab White Sands Missile Range N Mex
For primary bibliographic entry see Field 4A.
AD-653 001 HC$3.00 MF$0.65

A COMPARISON OF PIBAL WITH RAOB AND RAWIN WIND MEASUREMENTS,
Atmospheric Sciences Lab White Sands Missile Range N Mex
For primary bibliographic entry see Field 4A.
AD-653 004 HC$3.00 MF$0.65

RESULTS OF TESTS INVOLVING HEMISPHERICAL WIND SCREENS IN THE REDUCTION OF WIND NOISE,
Atmospheric Sciences Lab White Sands Missile Range N Mex
For primary bibliographic entry see Field 20A.
AD-653 005 HC$3.00 MF$0.65

RADAR ANGELS AND ATMOSPHERIC CONVECTION IN ARIZONA.
Army Electronics Command Fort Huachuca Ariz Research Div
For primary bibliographic entry see Field 17I.
AD-653 014 HC$3.00 MF$0.65

THE DISTRIBUTION OF EDDY VELOCITIES AND TEMPERATURE FLUCTUATIONS IN THE FIRST 100 METERS.
Technical rept.,
Army Electronics Command Fort Huachuca Ariz Research Div
Thomas H. Pries, and James F. Appleby. May 67. 67p
ECOM-6027

Descriptors: (*Atmospheric motion, *Statistical tests), Wind, Sampling, Stability, Atmospheric Temperature, Turbulence, Probability, Experimental data.

Practical problems dealing with atmospheric turbulence can be simplified by relating fluctuation values to a Gaussian distribution. This is very useful, since it specifies characteristics of the eddy velocity distributions. Fragmentary studies have given some evidence to support the Gaussian hypothesis, but to our knowledge this is the first attempt to examine the distributions of the fluctuation components for a large data sample (135 one-hour runs). The purpose of the study is to determine the deviations of the observed distribution from a normal distribution and to attempt to determine if these departures can be related to atmospheric stability surface roughness, and height above the surface. In addition, each sample was tested to determine the probability of its coming from a normal distribution. Results are in general agreement with previous investigations. Low frequency trends over hour periods tend to increase the departures from a normal distribution. Treating the probability distributions of the wind components as being normally distributed appears justified over moderate ranges of stability (z/L between -.300 and +.300). (Author)
AD-653 016 HC$3.00 MF$0.65

THERMODYNAMIC STUDIES OF A SNOW COVER IN NORTHERN MICHIGAN: ANALYSIS OF MICROMETEOROLOGICAL AND RELATED SNOW AND SOIL DATA FROM THE KEWEENAW FIELD STATION.
Michigan Univ Ann Arbor
For primary bibliographic entry see Field 8L.
AD-653 138 HC$3.00 MF$0.65

ICE THICKNESS OBSERVATIONS IN THE NORTH AMERICAN ARCTIC AND SUBARCTIC FOR 1958-59, 1959-60.
Cold Regions Research and Engineering Lab Hanover N H
For primary bibliographic entry see Field 8L.
AD-653 143 HC$3.00 MF$0.65

TABLE OF SOLAR ALTITUDES FOR GEOGRAPHICAL LATITUDES PLUS OR MINUS 77 10'.
Special rept.,
Cold Regions Research and Engineering Lab Hanover N H
Fritz Kasten. Jul 62. 178p Rept no. CRREL-SR-57

Descriptors: (*Solar atmosphere, Altitude), (*Altitude, Tables), Time, Meteorological parameters, Periodic variations, Geography, Computers, Equations, Polar regions, Accuracy, Measurement.

A table of solar altitudes as a function of time was prepared for a certain high geographical latitude and is presented in this report. Natural environment is, to a large extent, governed by weather and climate, which, in turn, are governed by meteorological elements. Since most of the meteorological elements are a function of time - both time of day and time of the year - a thorough analysis of meteorological data, particularly radiation quantities, requires an exact knowledge of the solar altitude at the time of measurement. This also holds for the long period of twilight in polar regions, anal-

ysis of which also requires some knowledge of negative solar altitudes. (Author)
AD-653 145 HC$3.00 MF$0.65

HORIZONTAL VISUAL RANGE IN POLAR WHITEOUT.
Main Univ (West Germany) Meteorologisch-Geophysikalisches Institut
For primary bibliographic entry see Field 6P.
AD-653 149 HC$3.00 MF$0.65

CONCERNING THE ORIGIN OF A THIN, ELEVATED NOCTURNAL FOG LAYER,
American Meteorological Society Boston Mass
L. Z. Prokh, and L. M. Roev. Apr 67, 10p Rept no. T-R-563
TT-67-62070
Contract AF 19 (628)-3880
K Voprosu o Zarozhdenii Tobkogo Sloya Pripodnyatogo Nochnogo Tumana, trans. of Ukrainskii Nauchno-Issledovatelskii Gidro-Meteorologicheskii Institut. Trudy (USSR), n48 p96-100 1965.

Descriptors: (*Fog, Air mass analysis), Boundary value problems, Equations, Meteorological phenomena, Heat transfer, Turbulence, Humidity, Atmospheric temperature.

The heat balance equations of a turbid isothermal layer of air warmer than the ground provided a criterion for calculating the rate of temperature change within this layer under specified conditions.
AD-653 166 HC$3.00 MF$0.65

SEPARATE MEASUREMENT OF UPWARD AND DOWNWARD RADIATION FLUXES,
American Meteorological Society Boston Mass
For primary bibliographic entry see Field 4A.
AD-653 170 HC$3.00 MF$0.65

CHARACTERISTICS OF FRONTAL CLOUDS SUSCEPTIBLE TO MODIFICATION OF NATURAL PRECIPITATION,
American Meteorological Society Boston Mass
I. N. Ponomarenko, A. M. Koshenko, and T. N. Zabolotskaya. Apr 67, 17p Rept no. T-R-526
TT-67-62075
Contract AF 19 (628)-3880
Kharakteristiki Frontalnykh Oblakov, Prigodnykh dlya Intensifikatsii Estestvennykh Osadkov, trans. of Ukrainskii Nauchno-Issledovatelskii Gidro-Meteorologicheskii Institut. Trudy (USSR), n47 p79-87 1965.

Descriptors: (*Clouds, Artificial precipitation), (*Artificial precipitation, Air mass analysis), USSR, Meteorological phenomena, Rainfall, Ice, Condensation, Atmospheric temperature, Cyclones.
Identifiers: Weather modification.

Data are given on the phase composition of clouds in frontal zones over the Ukraine and the characteristics of frontal cloud systems susceptible to artificial initiation of precipitation.
AD-653 171 HC$3.00 MF$0.65

RELATION BETWEEN THE NUMBER OF THUNDERSTORMS AND THE AMOUNT OF SFERICS THAT PRODUCE A FIELD STRENGTH GREATER THAN A GIVEN LEVEL,
American Meteorological Society Boston Mass
For primary bibliographic entry see Field 4A.
AD-653 172 HC$3.00 MF$0.65

EXPLANATION OF THE CAUSES OF NON-CORRESPONDENCES OF SFERICS CENTERS AND WEATHER CONDITIONS,
American Meteorological Society Boston Mass
For primary bibliographic entry see Field 4A.
AD-653 173 HC$3.00 MF$0.65

STUDY OF RAIN VERSUS SNOW AT OTIS AIR FORCE BASE DURING THE WINTER SEASON OF 1966-1967.
Rept. for 1 Dec 66-31 Mar 67,
Weather Squadron (12th) Otis AFB Mass Detachment 12
Henry Emile Forcier. 26 Apr 67, 25p

Descriptors: (*Snow, Weather forecasting), (*Rainfall, Weather forecasting), Measurement, Thickness, Massachusetts, Storms.

The thickness patterns 1000 - 850 MB, 1000 - 7000 MB, 1000 - 5000 MB for the winter season 1966 - 1967 were investigated using the ACK sounding plus temperatures at the 850 and 700 MB level to determine the possibility of the occurrence of snow and/or rain at Otis AFB. Furthermore, consideration was given to the precipitable water values from Nantucket and compared with the recorded water amounts at Otis. During the winter season 1966 - 1967 twenty-five case studies were investigated. Results are very promising. Graph C, 1000 - 700 MB Thickness vs 850 MB Temperature indicates the possibility in determining the state of the precipitation on a six-hour forecast basis at Otis AFB. (Author)
AD-653 187 HC$3.00 MF$0.65

AN APPROACH TO THE ANALYSIS OF SEA SURFACE TEMPERATURE DATA FOR UTILIZATION IN HURRICANE FORECASTING IN THE GULF OF MEXICO.
Master's thesis,
Texas A and M Univ College Station Dept of Oceanography
James Glen Taylor. Oct 66, 106p Rept no. Ref-66-25T
Contract Nonr2119 (04)
Prepared in cooperation with U. S. Weather Bureau.

Descriptors: (*Tropical cyclones, *Mexico Gulf), Hurricane tracking, Surface temperatures, Periodic variations, Time, Energy, Surface properties, Temperature, Sea water, Maps, Oceans, Weather forecasting, Storms, Climatology, Teletype systems, Oceanographic data, Tables.

Sea surface temperature (SST) patterns have been analyzed for four major hurricanes in the Gulf of Mexico in an effort to determine if routinely available SST data might be more fully utilized as an aid to the hurricane forecaster. SST data reported by merchant vessels are the primary data used in this study. Mean daily SST charts were prepared for approximately ten to twelve days prior to the time when each hurricane moved inland. Also, a series of 3-day, 5-day, and 7-day mean SST charts were prepared for Hurricane Hilda. The SST charts for Hurricanes Audrey, Carla, and Hilda were plotted and analyzed with the point of hurricane landfall known. In an attempt to stimulate realistic conditions and to insure an objective analysis, a series of daily mean SST charts for Hurricane Betsy were plotted while the storm was in progress. The conservative nature of ocean temperature is discussed, and it is stressed that a great amount of energy is required to make a significant change. It is pointed out that the SST data used are taken at varying depths in the first few meters below the surface, and that the values obtained are not necessarily the same as surface temperatures measured by radiation devices. It is suggested that even though there are obvious limitations to available SST data, it is possible that the data might be more fully utilized as an aid to the hurricane forecaster. (Author)
AD-653 269 HC$3.00 MF$0.65

METEOROLOGICAL RESEARCHES, NO. 15.
Academy of Sciences (USSR), Moscow. Soviet Geophysical Committee.
1966, 110p
in Russian, English Summaries

Descriptors: (*Measuring apparatus, *Meteorology, *Radiation distribution, *Radiometer, *Random error, Apparatus, Balance, Distribution, Error, Flux, Geophysics, Measurement, Meter, Radiation, Random, U.S.S.R., Ventilation, Wave.

For abstract, see STAR 05 14.
N67-27108 HC$3.00 MF$0.65

GLACIATION OF THE URALS, NO. 16.
Academy of Sciences (USSR), Moscow. Soviet Geophysical Committee.
For primary bibliographic entry see Field 8L.
For abstract, see STAR 05 14.
N67-27141 HC$3.00 MF$0.65

SPHERE BEHAVIOR AND THE MEASUREMENT OF WIND PROFILES.
National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
J. R. Scoggins. Jun 67, 61p NASA-TN-D-3994
Contract 160-44-04-00-62

Descriptors: (*Balloon sounding, *Motion stability, *Wind measurement, Aerodynamic, Balloon, Behavior, Equation, Force, Instability, Measurement, Motion, Profile, Sounding, Stability, Wind.

For abstract, see STAR 05 14.
N67-27289 HC$3.00 MF$0.65

THE MASS AND HEAT BUDGETS OF THE ATMOSPHERE OVER THE ANTARCTIC PLATEAU (WITH PARTICULAR REFERENCE TO SPRING).
Commonwealth Scientific and Industrial Research Organization, Melbourne (Australia).
F. A. Berson. 1965, 51p TR-6

Descriptors: (*Antarctica, *Heat budget, *Mass balance, Atmosphere, Balance, Budget, Circulation, Cooling, Eddy, Flux, Gain, Heat, Height, Loss, Mass, Pressure, Spring, Temperature, Wind.

For abstract, see STAR 05 14.
N67-27692 HC$3.00 MF$0.65

SATELLITE STUDY, TROPICAL NORTH ATLANTIC, 1963. PART I. SURFACE WIND ANALYSES, OCTOBER 1 - NOVEMBER 10,
Florida State Univ., Tallahassee. Dept. of Meteorology.
C. I. Aspliden, G. A. Dean, and H. Landers. Oct 66, 112p Rept. no. 66-5
Grant Cwb-WBG-58
See also PB-173 434, PB-169 056.

Descriptors: (*Meteorological satellites, Marine meteorology), (*Marine meteorology, Atlantic Ocean), Oceanology, Tropical regions, Cyclones, Meteorological charts, Wind, Weather forecasting.

The study includes the following: Preparation of the plotted maps; Analysis of the maps; Climatological aspects; Cyclone track charts; Summary; and Surface wind analyses.
PB-173 683 HC$3.00 MF$0.65

MULTIPLE ACCESS RELAYING FOR A SYNCHRONOUS OPERATIONAL METEOROLOGICAL SATELLITE.
Telcom, Inc., Arlington, Va.
For primary bibliographic entry see Field 22B.
PB-173 764 HC$3.00 MF$0.65

THE SCALES OF INTRA-CLOUD VARIATIONS IN METEOROLOGICAL PARAMETERS: HURRICANE CLOUDS.
Technical note,
Chicago Univ., Ill. Dept. of the Geophysical Sciences.

Bernice Ackerman. 15 Oct 66, 91p TN-35
Grants NSF-G-22292, NSF-GP-3881

Descriptors: (*Meteorological parameters, Clouds), (*Clouds, Tropical cyclones), Atmospheric motion, Wind, Turbulence, Rain, Recording systems, Convection (Atmospheric), Gusts.

As in-cloud measurements have accumulated over the past decade or two, the evidence has overwhelmingly indicated heterogeneity in cloud structure. This characteristic has been manifested in the form of rapid fluctuations in any number of meteorological parameters, from temperature to droplet concentration, as airplanes traversed clouds. The research reported here was aimed at determining whether these fluctuations were random and if not, whether they tended to occur on some preferred horizontal scale. To this end variance spectrum analysis was carried out on continuous measurements of temperature, liquid-water content and airspeed obtained in hurricane cloud systems.
PB-173 827 HC$3.00 MF$0.65

TIROS-VIEWED JET STREAM CLOUD PATTERNS IN RELATION TO WIND, TEMPERATURE, AND TURBULENCE.
Final rept., Jul 65-Aug 66,
Stanford Research Inst., Menlo Park, Calif.
W. Viezee, S. M. Serebreny, R. M. Endlich, and R. M. Trudeau. Oct 66, 150p
Contract Cwb-11129

Descriptors: (*Cirrus clouds, Jet streams (Meteorology)), (*Meteorological phenomena, Cirrus clouds), Wind, Atmospheric temperature, Clear air turbulence, Shear stresses, Photographs.

Twenty cases of jet-stream cirrus clouds observed in TIROS photographs are related to the atmospheric wind and temperature structure. Standard rawinsonde observations provide the basis for the meteorological analysis. The orientation of cloud features identified as shadow lines, sharp-edged cirrus sheets, cirrus bands, and transverse waves is compared with the horizontal wind and the vertical wind shear in the upper troposphere. These cloud features appear to relate better to the speed and direction of the horizontm wind than to the vertical wind shear. All available pilot reports, both of clear-air turbulence and no clear-air turbulence, are collected for areas covered by the TIROS photographs. The intensity and spatial distribution of turbulence are related to the various jet-stream cloud features. A relatively large number of turbulence reports are found near long shadow lines and sharp-edged cirrus sheets. The results of the study indicate that cirrus cloud features recognizable in satellite photographs provide information that may be useful in the operational analysis of winds, temperature, and turbulence. (Author)
PB-173 934 HC$3.00 MF$0.65

ON THE STRUCTURE OF HURRICANE JANICE (1958).
Technical memo.,
National Hurricane Research Lab., Miami, Fla.
R. C. Sheets. Apr 67, 44p IERTM-NHRL-76

Descriptors: (*Tropical cyclones, Structural properties), (*Hurricane tracking, Radar images), Cuba, Puerto Rico, Caribbean Sea, Atlantic ocean, Bahama Islands, Radar tracking, Rainfall, Meteorological phenomena, Meteorological charts, Air mass analysis, Barometric pressure, Marine meteorology.
Identifiers: Hurricane Janice (1958).

Hurricane Janice first appeared as a disturbed area south of Cuba. The first of seven missions flown into the storm occurred on October 5, before it had attained hurricane intensity, the last on October 9, just before the storm experienced a rapid acceleration and intensification. The structure of hurricane Janice during the developing and mature stages is described in this report. Profiles, horizontal cross sections, and radar photograph composites are presented. Particular attention has been given to the radar structure because of the somewhat three-dimensional nature of the data. (Author)
PB-174 666 HC$3.00 MF$0.65

ON THE STRUCTURE OF HURRICANE ELLA (1962).
Technical memo.,
National Hurricane Research Lab., Miami, Fla.
R. C. Sheets. Apr 67, 39p IERTM-NHRL-77

Descriptors: (*Tropical cyclones, Structural properties), (*Hurricane tracking, Radar images), Bahama Islanus, Atlantic Ocean, Cloud cover, Meteorological phenomena, Convection (Atmospheric), Wind, Atmospheric temperature, Rainfall, Barometric pressure, Marine meteorology, Air mass analysis, Troposphere.
Identifiers: Hurricane Ella (1962).

The U. S. Weather Bureau research aircraft investigated this storm during 4 days of a 5-day period. The investigation included 2 days of data obtained before the storm had reached hurricane intensity and 2 days of data obtained after the storm had attained hurricane strength. Therefore, the data presented here depicts the storm during its developing and mature stages. The structure of the storm is presented in the form profiles and horizontal cross sections of the various parameters, including winds, temperature, pressure, and precipitation fields in the form of radar presentations. An unusual flow pattern observed on October 17 is investigated in some detail and the divergence field is presented for one level on this day. Also, the changing thermal structure is discussed in some detail. (Author)
PB-174 667 HC$3.00 MF$0.65

CLIMATOLOGY OF STAGNATING ANTICYCLONES EAST OF THE ROCKY MOUNTAINS, 1936-1965,
National Center for Air Pollution Control, Cincinnati, Ohio.
Julius Korshover. 1967, 21p
PHS-Pub-999-AP-34

Descriptors: (*Anticyclones, Air pollution), (*Air pollution, Urban areas), United States, Climatology, Meteorological charts, Meteorological parameters, Barometric pressure, Motion, Contamination, Air mass analysis.

Since stagnating anticyclones are often associated with incidents of heavy air pollution in urban areas, a 30-year climatology is presented to delineate occurrences of stagnating anticyclones in the eastern United States. Occurrences of stagnation are determined on the basis of pressure-gradient values considered with other meteorological factors. Affected areas are depicted on maps by use of a system of grid points. Data showing cases of stagnation (i.e., episodes) and total days of stagnation indicate that stagnation is most likely to occur in autumn months. (Author)
PB-174 709 HC$3.00 MF$0.65

FEATURES AND MOTIONS OF RADAR ECHOES ON PALM SUNDAY, 1965.
Research paper,
Chicago Univ., Ill. Satellite and Mesometeorology Research Project.
Dorothy L. Bradbury, and Tetsuya Fujita. Jun 66, 24p SMRP-RP-51
Grant Cwb-WBG-70
Rept. on Comprehensive Study of the Palm Sunday Tornadoes, 1965. Chapter V.

Descriptors: (*Tornadoes, Tracking), (*Radar echo areas, Tornadoes), Indiana, Illinois, Michigan, Ohio, Clouds, Radar images, Meteorological charts, Meteorological phenomena, Storms, Gusts, Weather forecasting, Wind.

An abundant amount of radar data gathered on Palm Sunday 1965 has been used to make a detailed study of the development of the tornado producing echoes. The echoes were matched with damage paths and reported time of occurrences, and then designated as separate tornado families. The rate and direction of motion of individual echoes were determined by plotting time-space positions of the echoes at 10 minute intervals from several radar stations. A composite of radar photographs from three stations at intervals of from two minutes to ten minutes was used to show the growth rate and change in features of severe storm echoes. Using the combined radar echoes from all available stations to supplement pressure, wind and dewpoint data, a detailed synoptic analysis was made for the period 11 through 23 CST. It was shown that the severe storm activity was associated with the advance of a dry cold front. (Author)
PB-174 797 HC$3.00 MF$0.65

RELATIONSHIP BETWEEN THE TANGENTIAL WIND FIELD AND THE TRANSVERSE CIRCULATIONS OF TROPICAL CYCLONES.
Final rept.,
Hawaii Inst. of Geophysics, Honolulu.
M. A. Estoque. Oct 66, 45p HIG-66-22
Grant Cwb-WBG-66

Descriptors: (*Tropical cyclones, *Tropical regions), (*Cloud cover, Tropical cyclones), (*Cirrus clouds, Tropical cyclones), Models (Simulations), Theory, Wind, Meteorological satellites, Meteorological phenomena, Meteorology, Clouds, Storms.

The relationship between tropical cyclone intensity and the extent of the accompanying cirrus shield is investigated theoretically. The approach is based on computing the vertical and the radial motion from specified tangential wind distributions using the equations of motion and then trying to correlate these computed motions with the cirrus cloudiness. The results indicate that strong tangential winds are associated th strong and extensive upward motions, thus tending to qualitatively confirm satellite observations. However, the theoretical models which have been used are not sufficiently realistic to provide a meaningful quantitative relationship between cyclone intensity and characteristics of the cirrus shield. (Author)
PB-174 801 HC$3.00 MF$0.65

COMPUTER PROGRAM FOR CALCULATING THE ATMOSPHERIC DISPERSION OF LARGE CLOUDS,
California Univ., Livermore. Lawrence Radiation Lab.
For primary bibliographic entry see Field 18C.
For abstract, see NSA 21 12.
UCRL-50179 HC$3.00 MF$0.65

5. BEHAVIORAL AND SOCIAL SCIENCES

5A. ADMINISTRATION AND MANAGEMENT

A PROCEDURAL GUIDE TO OPERATIONAL SEQUENCE ANALYSIS IN PERSONNEL RESEARCH.
Naval Personnel Research Activity, San Diego, Calif.
For primary bibliographic entry see Field 5I.
AD-477 767 HC$3.00 MF$0.65

CLASSIFICATION MANAGEMENT: AN ANALYSIS OF THE NEED FOR SUCH PROGRAMS IN DEFENSE-ORIENTED COMPANIES.
Master's thesis,
Ohio State Univ., Columbus.
Robert Lewis Taylor. 1966, 124p

Descriptors: (*Documentation, Classification), (*Department of Defense, *Contracts), (*Management control systems, Documentation), National defense, Organizations, Management engineering, Industries, Cost effectiveness, Personnel management, Theses.

The purpose of the thesis is to examine classification management in light of government direction and industry implementation. Criteria for evaluation is in terms of cost avoidance and information flow. The objective is to prove that all Department of Defense contractors holding classified contracts can benefit from a good classification management program. (Author)
AD-644 226 HC$3.00 MF$0.65

TRANSFER PRICING IN A DECENTRALIZED FIRM: A DECOMPOSITION ALGORITHM FOR QUADRATIC PROGRAMMING.
Carnegie Inst of Tech Pittsburgh Pa Management Sciences Research Group
For primary bibliographic entry see Field 12A.
AD-652 916 HC$3.00 MF$0.65

PROCEEDINGS OF THE SYMPOSIUM ON MANAGING THE DEVELOPMENT OF LARGE COMPUTER PROGRAM SYSTEMS, JANUARY 21-23 1963,
System Development Corp Santa Monica Calif
For primary bibliographic entry see Field 9B.
AD-652 982 HC$3.00 MF$0.65

INTRODUCTION TO EXTENDED, TIME-SHARED PROCESSOR SYSTEMS.
Army Electronics Command Fort Monmouth NJ
For primary bibliographic entry see Field 9B.
AD-653 142 HC$3.00 MF$0.65

THE COST OF BASIC SCIENTIFIC RESEARCH IN EUROPE: DEPARTMENT OF DEFENSE EXPERIENCE, 1956-1966,
Rand Corp Santa Monica Calif
For primary bibliographic entry see Field 5C.
AD-653 177 HC$3.00 MF$0.65

SOME BAYESIAN STRATIFIED TWO-PHASE SAMPLING RESULTS.
Wisconsin Univ Madison Dept of Statistics
For primary bibliographic entry see Field 12B.
AD-653 264 HC$3.00 MF$0.65

5B. DOCUMENTATION AND INFORMATION TECHNOLOGY

A PROPOSED CHEMICAL INFORMATION AND DATA SYSTEM, VOLUME I.
Comprehensive summary rept., 15 Apr-31 Dec 65,
Pennsylvania Univ., Philadelphia. Inst. for Cooperative Research.
Clarence T. Van Meter, David Lefkovitz, and Samuel D. Bedrosian. Dec 65, 248p CIDS-3
Contract DA-18-035-AMC-288 (A)

Descriptors: (*Chemistry, *Information retrieval), Technical information centers, Data processing systems, Time sharing, Data transmission systems, Molecular Structure, Coding, Search theory, Computer programs, Subroutines, Subject indexing, Input-output devices, Data storage systems.
Identifiers: CIDS project, Chemical notation systems.

The primary purpose of this report is to describe the current state of exploratory development of a Chemical Information and Data System designed to meet the needs of the United States Army. It treats in detail of the plans and computer programs which have been formulated to permit large scale experimentation with CIDS. The prime objective of this experimentation is to accumulate sufficient experience with the system to permit the Army to reach final decision with respect to its operational utility. In addition to matters broadly referable to system contents (i.e., chemicals, information, and data), such experimentation involves inquiry into matters such as economics of the system; personnel, equipment, and space requirements; communication facilities; and the extent to which the system satisfies practical needs of the Army. The experimental system, currently in pilot test, has the distinct advantage of operating in either real time or batched mode. The system is time shared among the several users who may query the file simultaneously via remote teletypes or chemical typewriters so that each receives a real time service. (Author)
AD-479 679 HC$3.00 MF$0.65

CLASSIFICATION MANAGEMENT: AN ANALYSIS OF THE NEED FOR SUCH PROGRAMS IN DEFENSE-ORIENTED COMPANIES.
Ohio State Univ., Columbus.
For primary bibliographic entry see Field 5A.
AD-644 226 HC$3.00 MF$0.65

THE ROLE OF SEARCHING SERVICES IN AN ACQUISITIONS PROGRAM,
Dayton Univ Ohio Research Inst
Antoinette L. Lueck, James M. Tierney, and Ann T. Dodson. 31 May 67, 9p
AFAPL-Conf-67-9
Contract AF 33 (615)-2993
Presented at the Annual Convention of Special Libraries Association (58th), New York City, 28 May-1 Jun 67.

Descriptors: (*Documentation, *Technical information centers), (*Libraries, *Information retrieval), Air Force, Engineering personnel, Bibliographies, Abstracts, Reports, Classification, Department of Defense.

A user presents his point of view of literature searching through the major searching services in the overall program of acquisitions for the engineering staff of the Air Force Aero Propulsion Laboratory. These major searching services include the Defense Documentation Center (DDC), the National Aeronautics and Space Administration (NASA), the Science Information Exchange (SIE), and the National Referral Center (NRC). Procedures have been established within the laboratory for utilizing these searching services. These procedures include writing and submitting the requests for retrospective literature searches and interest profiles for current-awareness services as well as the subsequent acquisition of documents and information cited in the returns. The relative value of the returns from these searching services is described; the value of a search return is determined by its completeness, response time, format, accuracy, and availability of cited information.
AD-652 737 HC$3.00 MF$0.65

CHEMICAL DATA COMPILATION ANALYSIS SURVEY.
Final rept.,
Science Communication Inc Washington D C
R. G. Brunner, B. K. Farris, S. I. Jover, and D. O. Myatt. 20 Mar 67, 154p
Contract NSF-C-478

Descriptors: (*Chemistry, *Data processing systems), (*Documentation, Chemistry), Technical information centers, Computers, Data, Data storage systems, Information retrieval, Subject indexing.

A major objective of the study is the development and application of a methodology for analysis and characterization of chemical data compilation activities. The basic analysis technique tested was the examination of eac i data compilation as a data file and its substance and property coverage. However, because of the complex interactions which exist between a data compilation activity and the environment on which it is operated and the technical activity which it supports, the study also examined operating statistics, operating motives, users served and other factors that might shed light on basic design factors. Emphasis was placed upon obtaining a greater amount of information relevant to the design elements associated with the actual development of a national chemical information system. (Author)
AD-652 742 HC$3.00 MF$0.65

LIST OF LIBRARY ACCESSIONS.
Federal Fire Council Washington D C
For primary bibliographic entry see Field 13L.
AD-652 866 HC$3.00 MF$0.65

TECHNICAL MANUAL WRITING GUIDE: GENERAL REQUIREMENTS.
Army Rocket and Guided Missile Agency Redstone Arsenal Ala
20 Jul 61, 22p Rept no. ARGMA Pub-1

Descriptors: (*Instruction manuals, Military requirements), Documentation, Language, Ordnance, Symbols, Numbers, Preparation, Grammars.
Identifiers: Technical manuals, Technical writing.

Contents: Introduction to technical writing (Authority references, Purpose, Writing style, Readership); Manuscript preparation (Special RA NMPC instructions, Organization, Instruction level, Division in text, Heading style, References, Notes, cautions, warnings, Abbreviations, Nomenclature, Part numbers, Illustrations); Copy and editing rules (Editing copy, Page endings, Copy binding, Tables, Capitalization, Proofreading copy, Proofreader's symbols, Spelling, Compounding words, Numerals, Articles, Additions and deletions, Indexing); Technical publications manuscript preparation procedure; Dummy book preparation.
AD-652 883 HC$3.00 MF$0.65

CODING AND ANALYSIS OF DOCUMENTARY MATERIALS FROM COMMUNIST CHINA,
California Univ Berkeley Survey Research Center
Paul Wong. 1967, 15p Rept no. SRC-A-69
AFOSR-67-1187
Grant AF-AFOSR-1003-66
Availability: Published in Asian Survey p198-211 Mar 1967.

Descriptors: (*Documentation, Analysis), (*China, Military intelligence), (*Coding, Chinese language), Sociology, Economics, Political science, Communism, Data processing systems, Data, Periodicals.

The argument is made that the utilization of a qualitative-quantitative mode of analysis may yield valuable insights on the social, economic and political developments in Communist China. The method of coding involved in the qualitative-quantitative mode of analysis is discussed. Concrete examples are drawn from a content analysis project. Finally, several specific hypotheses encountered in the content analysis project are presented to demonstrate the utility of the qualitative-quantitative mode of analysis. (Author)
AD-652 986 Not available from CFSTI.

PHYSICS: A SELECTED LIST OF MATERIALS IN THE LIBRARY OF THE NAVAL POSTGRADUATE SCHOOL COMPILED AS A GUIDE TO FACILITATE THE USE OF THE COLLECTION.

Technical rept. research paper.
Naval Postgraduate School Monterey Calif
E. R. Larson. Mar 67, 31p Rept no. TR/RP-79

Descriptors: (*Physics, *Bibliographies), (*Libraries, *Technical information centers), Documentation, Universities, Navy, Abstracts, Indexes, Periodicals, Handbooks.

This bibliography is intended as a guide to the collection of the Naval postgraduate school library in the field of physics. It is not a comprehensive listing of such material but is selective and reflects the holdings of this library. In some cases the publications listed are representative of other related materials also in the school library.
AD-653 077 HC$3.00 MF$0.65

BIBLIOGRAPHY: GRAPH THEORY AND COMBINATORIAL THEORY.
Michigan Univ Ann Arbor
For primary bibliographic entry see Field 12A.
AD-653 226 HC$3.00 MF$0.65

STATUS AND ORGANIZATION OF TECHNICAL AND SCIENTIFIC DOCUMENTATION AND INFORMATION IN THE FEDERAL REPUBLIC OF GERMANY,
Advisory Group for Aerospace Research and Development Paris (France)
H. Lechmann. Oct 65, 20p Rept no. AGARD-545
Presented at the Meeting of the AGARD Technical Information Panel (18th), held in Washington, D. C., 7 Oct 65. NATO Furnished.

Descriptors: (*Technical information centers, West Germany), Documentation, Information retrieval, Libraries, Scientific research, National defense.

The report lists the technical and scientific documentation and information centers in the Federal Republic of Germany, both for civil purposes and for defense, and gives the functions of each and their co-ordination together. This Paper was presented at the Eighteenth Meeting of the AGARD Technical Information Panel, held in Washington, USA, 7 October 1965. (Author)
AD-653 254 HC$3.00 MF$0.65

EXPERIMENTAL RETRIEVAL SYSTEMS STUDIES. REPORT NO. 2: SYSTEMS MANUAL FOR EXPERIMENTAL LITERATURE COLLECTION AND REFERENCE RETRIEVAL SYSTEM,
Lehigh Univ Bethlehem Pa Center for the Information Sciences
Ronald R. Anderson, Anthony F. Amico, and James S. Green. 15 Apr 67, 59p
Contract Nonr-610 (08), Grant AF-AFOSR-724-65
Rept. no. 1, PB-173 218; Rept. no. 3, AD-653 280.

Descriptors: (*Information retrieval, Reports), Instruction manuals, Technical information centers, Programming languages, Teletype systems, Subject indexing, Training, Computer programs.
Identifiers: GE 225 computer.

The manual describes and documents the retrieval system used by the Center for the Information Sciences for selected current literature of the information sciences, about 2,500 document references. The system is presently on-line via teletype and conversion is in process from tape to disk. Both associative and non-associative search systems are in operation. (Author)
AD-653 279 HC$3.00 MF$0.65

EXPERIMENTAL RETRIEVAL SYSTEMS STUDIES. REPORT NO. 3,
Lehigh Univ Bethlehem Pa Center for the Information Sciences
Ronald R. Anderson, Andrew J. Kasarda, and David M. Reed. 15 Apr 67, 88p
Contract Nonr-610 (08), Grant NSF-GE-2569
See also Rept. no. 2, AD-653 279.

Descriptors: (*Information retrieval, Reports), Subject indexing, Effectiveness, Search theory, Automatic, Documentation, Design, Syntax, Semantics, Computer programs, Statistical analysis, Artificial intelligence, Learning, Technical information centers.

Contents: An associativity technique for automatically optimizing retrieval results; A syntactically oriented natural language document retrieval system with a browsability feature ; Phrase indexing.
AD-653 280 HC$3.00 MF$0.65

PLANNING, DEVELOPING AND TESTING EXPERIMENTAL TECHNOLOGY UTILIZATION PROGRAMS QUARTERLY REPORT, OCT. 1-DEC. 31, 1966.
Indiana Univ., Bloomington.
31 Dec 66, 15p NASA-CR-84154
Contract NSR-15-003-032

Descriptors: *Aerospace technology, *Industry, *Information retrieval, *University program, Aerospace, Application, Computer, Experiment, Information, Planning, Profile, Program, Retrieval, Science, Technology, University, Utilization.

For abstract, see STAR 05 14.
N67-26510 HC$3.00 MF$0.65

CUMULATIVE INDEX TO NASA TECH BRIEFS, 1963 - 1966.
National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va. Feb 67, 166p NASA-SP-5021/04/

Descriptors: *Bibliography, *Life science, *Materials science, *Physical science, *Technology, Abstract, Chemistry, Electric, Electronic, Energy, Index, Life, Material, Mechanical, Physical, Science, Source.

For abstract, see STAR 05 14.
N67-27296 HC$3.00 MF$0.65

PRINTING - REPRODUCTION SYSTEM ANALYSIS FOR THE OFFICE OF TECHNICAL SERVICES,
Office of Technical Services, Washington, D.C.
Peter F. Urbach. 3 Mar 64, 125p

Descriptors: (*Reports, Reproduction), (*Printing, *Costs), (*Documentation, *Cost effectiveness), Microfiche, Microfilm, Technical information centers, Statistical analysis, Optimization, Production, Physical properties.
Identifiers: Office of Technical Services, Cost analysis.

An analysis is made of a number of alternative methods and costs for producing microfilm, microfiche and hardcopy of technical reports. Alternative microfiche sizes and blowback and printing methods are explored as a function of cost, document size and expected demand. The 4 x 6 inch microfiche is found to be the optimum fiche size. Optimum crossover points between different reproduction techniques are determined on the basis of cost and demand parameters. Recommendations are made for a printing-reproduction system for the Office of Technical Services. A statistical analysis of document characteristics is made in a supplementary analysis prepared by Westat Research Analysts, Inc. This analysis gives distribution of pages in AEC, DoD, NASA and OTS technical reports, the distribution of type size and estimates of the quality of copy. (Author)
PB-174 737 HC$3.00 MF$0.65

DEVELOPMENT OF NOTATION AND DATA STRUCTURE FOR COMPUTER APPLICAT IONS TO BUILDING PROBLEMS.
Bolt Beranek and Newman, Inc., Van Nuys, Calif.
For primary bibliographic entry see Field 13M.
PB-174 795 HC$3.00 MF$0.65

SCIENTIFIC INFORMATION EXCHANGE AT AN INTERDISCIPLINARY BEHAVIORAL SCIENCE CONVENTION,
Stanford Univ., Calif. Inst. for Communication Research.
For primary bibliographic entry see Field 5J.
PB-174 837 HC$3.00 MF$0.65

RADIOISOTOPES IN THE BIOLOGICAL SCIENCES. AN ANNOTATED BIBLIOGRAPHY OF SELECTED LITERATURE,
Division of Technical Information Extension (AEC), Oak Ridge, Tenn.
For primary bibliographic entry see Field 6R.
For abstract, see NSA 21 12.
TID-3585 HC$3.00 MF$0.65

5C. ECONOMICS

PRIVATE AND PUBLIC CONSUMPTION AND SAVINGS IN THE VON NEUMANN MODEL OF AN EXPANDING ECONOMY,
Princeton Univ N J Econometric Research Program
Oskar Morgenstern, and Gerald L. Thompson. 1967, 24p
Prepared in cooperation with Carnegie Inst. of Tech., Pittsburgh, Pa. Research supported in part by ONR.
Availability: Published in Kyklos v20 n1 p387-409 1967.

Descriptors: (*Economics, Mathematical models), Consumption, Matrix algebra, Theorems.
Identifiers: Savings, Von Neumann model.

The purpose of studying models of the type under investigation is not at first to make them 'realistic', but rather to see whether such models are at all logically possible and what their properties would be. It was shown, how outside demand could be introduced, how its variation affects growth rates and interest rates; allowance was made for technological progress appearing in the form of new, more efficient processes, and described the possibilities and consequences of aggregation in the model. Perhaps most important, the model described the phenomenon of 'sub-economies', each one of which having its own expansion rate and interest rate, their total number proving to be finite. Also shown is the possibility of non-uniqueness of von Neumann balanced growth paths, of importance for the turnpike problems. (Author)
AD-652 782 Not available from CFSTI.

THE EVALUATION OF NON-MARKETABLE INVESTMENTS.
Reviseu ed.,
Center for Naval Analyses Washington D C Systems Evaluation Group
V. L. Broussalian. Oct 66, 56p Rept no. SEG Research Contrib-9
Contract Nonr-3732 (00)
AD-622 269-Superseded.

Descriptors: (*Decision making, *Economics), (*Costs, Distribution (Economics)), United States government, Optimization, Probability, Value engineering, Population, Management engineering, Weapon systems, National defense, Commerce, Federal budgets, Game theory.

The evaluation of non-marketable investments, of which defense projec ts are the most typical, presents difficulties not encountered in the case of

marketable investments. The net effect of these difficulties is to render the operation of discounting, which is implied by economic theory for the evaluation of marketable investments, meaningless. Hence the search for a theoretically correct rate of discount to apply to such inzestments is bound to be futile. The benefits and costs of a nonmarketable investment must ultimately be evaluated directly without the intermediate step of discounting. However, neither from a theoretical nor from a practical point of view can there be any objection to providing the decision-maker with present values calculated on the bases of different rates of discount, so long as no claim is made as to which is the correct one. But it is absolutely essential to provide him with the series of costs and benefits undiscounted.
AD-652 821 HC$3.00 MF$0.65

AREA HANDBOOK FOR ECUADOR,
American Univ Washington D C Foreign Area Studies Div
For primary bibliographic entry see Field 8F.
AD-653 025 MF$0.65

THE COURNOT EQUILIBRIUM IN A NONSYMMETRIC OLIGOPOLISTIC MARKET,
Yale Univ New Haven Conn Cowles Foundation for Research in Economics
Richard Levitan, and Martin Shubik. 16 May 67, 10p Rept no. Cowles Foundation Paper-224
Contract Nonr-3055 (01)
Part 6 of rept. on A Business Game for Teaching and Research Purposes. Prepared in cooperation with IBM Watson Research Center, Yorktown Heights, N. Y., Mathematical Sciences Dept. See also AD-653 087.

Descriptors: (*Economics, *Mathematical prediction), (*Game theory, *Mathematical models), Commerce, Operations research, Costs, Matrix algebra, Vector analysis, Problem solving, Money, Approximation (Mathematics), Production, Education, Scientific research.

When there are differentiated products a limited general equilibrium model determines the set of prices which will just clear all markets. A detailed analysis of this problem and its relationship to rationing and general equilibrium has been given.
AD-653 086 HC$3.00 MF$0.65

THE NONSYMMETRIC GAME: JOINT MAXIMUM, EFFICIENT SOLUTION AND MEASURES OF COLLUSION AND WELFARE,
Yale Univ New Haven Conn Cowles Foundation for Research in Economics
Richard Levitan, and Martin Shubik. 31 May 67, 20p Rept no. Cowles Foundation Paper-225
Contract Nonr-3055 (01)
Part 5 of rept. on A Business Game for Teaching and Research Purposes. See also AD-653 086. Prepared in cooperation with IBM Watson Research Center, Yorktown Heights, N. Y., Mathematical Sciences Dept.

Descriptors: (*Economics, Problem solving), (*Game theory, Asymptotic series), Commerce, Convergence, Operations research, Education, Scientific research, Social psychology, Behavior, Learning, Attitudes, Psychometrics, Optimization, Industries, Production, Efficiency, Costs, Matrix algebra, Vector analysis, Money.

The mathematical structure for a nonsymmetric model of a market is given and the resulting n-person nonconstant sum game was examined and solved for the non-cooperative equilibrium point. Two further solutions are considered and the problem of comparing them is discussed.
AD-653 087 HC$3.00 MF$0.65

THE COST OF BASIC SCIENTIFIC RESEARCH IN EUROPE: DEPARTMENT OF DEFENSE EXPERIENCE, 1956-1966,
Rand Corp Santa Monica Calif
E. D. Brunner. Apr 67, 57p Rept no. RM-5275-PR
Contract F44620-67-C-0045

Descriptors: (*Scientific research, Costs), (*Europe, Scientific research), (*Department of Defense, Budgets), Scientific personnel, Wages, Federal budgets, Statistical data.

An analysis is presented of the cost of basic scientific research obtained in Europe and Israel from 1956 through 1966 by agencies of the Department of Defense. Cost-sharing agreements with European institutions and grants have prevented the average cost of research agreements from rising between 1961-1962 and 1965-1966. In the case of non-cost-sharing agreements, however, the cost has increased throughout the entire period. An analysis of the average cost per scientist per man-month for all types of research revealr that the cost of basic research obtained in the United States ranged from three to four times the cost in Europe. (Author)
AD-653 177 HC$3.00 MF$0.65

FIRST TARGET PROGRAMME FOR THE EUROPEAN ATOMIC ENERGY COMMUNITY.
European Atomic Energy Community, Brussels (Belgium). Directorate-general for Industry and Economy.
For primary bibliographic entry see Field 18E.
For abstract, see STAR 05 14.
N67-27551 HC$3.00 MF$0.65

ECONOMIC IMPACT OF INTERSTATE AND DEFENSE HIGHWAY 35 ON PERRY, OKLAHOMA.
Interim rept., 1961-64,
Oklahoma State Dept. of Highways. Research and Development Div.
A. H. Cristensen, and B. C. Hartronft. 1966, 120p Rept. no. 0551
Prepared in cooperation with Bureau of Public Roads, Washington, D. C.

Descriptors: (*Roads, *Oklahoma), (*Urban areas, Economics), Commerce, Population, Transportation, Gasoline, Employment.

The report shows the immediate trends, over a 48 month period, of the effects of the opening of Interstate 35 on Perry, Oklahoma, and compares it with the control city, Woodward, Oklahoma, using a number of indicators for analysis. Included are economic, social and other indicators such as land use, education, agriculture production, climate, employment, population, labor force, wages, personal income, bank deposits, postal receipts, and traffic volume. Data for Noble (Perry) and Woodward Counties are also analyzed to help understand the trade area and the economic factors influencing the economies of these two counties. Perry has become a convenient refueling stop for I-35 traffic. One surprising development found by the researchers, was that despite the decrease in Sales Tax Collection (sales taxes for Perry were down slightly while the control city, Woodward, registered a gain of nearly six percent, and the State had a gain of nearly 11 percent for the same period) Perry showed a 10 percent increase in gasoline gallonage pumped. The control city, Woodward, was right behind with an increase in gallonage of nearly 10 percent compared with a smaller Statewide gain of four percent. The popularity of Perry as a stop was further evidenced by the employment of an estimated 50 persons, male and female, at these interchange areas, with many of the establishments open 24 hours a day. (BPR abstract)
PB-173 729 HC$3.00 MF$0.65

WASHINGTON AREA MOTOR VEHICLE ACCIDENT COST STUDY (WAMVACS).
Smith (Wilbur) and Associates, New Haven, Conn.
For primary bibliographic entry see Field 13L.
PB-173 859 HC$3.00 MF$0.65

MANAGEMENT COUNSELING AND TECHNICAL ASSISTANCE PROJECT.
Annual rept. no.1, 15 Jun 65-31 Oct 66.
Cleveland Small Business Opportunity and Development Corp., Ohio.
Nov 66, 82p
Contract B39-836
Prepared in cooperation with Economic Development Administration, Washington, D. C.

Descriptors: (*Economics, *Ohio), (*Commerce, Ohio), Management engineering, Design, Training, Maps, Effectiveness, Costs, Budgets, Industries, Tables, Labor, Money, Employment, Rehabilitation, Feasibility studies.
Identifiers: Area Redevelopment.

The Cleveland Small Business Opportunity and Development Corporation reports on its first year of management counseling and technical assistance ope rations. The report conveys a picture of the prevailing socio-economic setting, climate, and trends pertaining to: project areas and characteristics; objectives; design; programs; conclusions and recommendations; operation; and findings.
PB-174 719 HC$3.00 MF$0.65

OPPORTUNITIES IN TOURISM AND RECREATION IN SOUTHEASTERN MASSACHUSETTS.
Wolf Management Services, New York.
May 67, 238p
Contract C-277-66
Prepared in cooperation with Economic Development Administration, Washington, D. C.

Descriptors: (*Recreation, *Massachusetts), Feasibility studies, Economics, Traffic, Population, Industries, Urban areas, Agriculture, Rural areas, Forestry, Transportation, Roads, Tables, Maps, Beaches, Museums, Commerce, Money.
Identifiers: Tourist industry.

The study contains the development of the economic opportunities growing out of the recreation and tourist resources of Southeastern Massachusetts. It has a broad base of support in the study area. The region itself represents a grouping of convenience rather than an economic or political unit. Some of the 30 towns and cities are highly urbanized and industry-oriented. Some are rural, some agricultural, some suburban. Population density ranges from 50 to over 5000 per square mile. And of course some towns have great attractiveness for tourists, while others have little potential for this industry. Southeastern Massachusetts appears to have a great deal of intrinsic tourist and recreation value. (Author)
PB-174 745 HC$3.00 MF$0.65

AUDIO-VISUAL EQUIPMENT IN THE UNITED KINGDOM.
Comart Research Ltd., London (England).
Oct 65, 44p
PB-173 705-Superseded. Prepared in cooperation with Business and Defense Services Administration, Washington, D. C. Rept. on Foreign Market Survey.

Descriptors: (*Display systems, *Photographic equipment), (*Commerce, *Great Britain), Economics, Cameras, Costs, Recording systems, Budgets, Consumption, Law, Classification, Photographic projectors.

Content: Objective and extent of the survey; Measurement and classification of the market; Factors affecting the market; Size of market 1961-67; Specific products information; Structure and

attitudes of the trade; Factors affecting U.S. participation. (Author)
PB-174 752 HC$3.00 MF$0.65

CORROSION PROTECTION METHODS AND MATERIALS IN SWEDEN.
Squires (C.K.), Stockholm (Sweden).
Oct 65, 43p
PB-173 375-Superseded. Prepared in cooperation with Business and Defense Services Administration, Washington, D. C. Rept. on Foreign Market Survey.

Descriptors: (*Protective treatments, *Coatings), (*Commerce, *Sweden), Paints, Bituminous coatings, Plastic paints, Costs, Economics, Law, Protection, Metal coatings, Surface properties.

Content: Paints and bitumen coatings; Plastic skin coatings; Metal finishing and protective coating; Cathodic protection; Temporary protection; Preparation of surfaces for protection coating; The Swedish corrosion Committee; Congresses and meetings; Distribution; Terms of trade; Import duties; Acceptance of US products; The case for a Trade Center Show. (Author)
PB-174 776 HC$3.00 MF$0.65

DAIRY MACHINERY IN WEST GERMANY.
Wegenstein (Knight) G.m.b.H., Duesseldorf (West Germany).
Mar 66, 18p
PB-173 707-Superseded. Prepared in cooperation with Business and Defense Services Administration, Washington, D. C. Rept. on Foreign Market Survey.

Descriptors: (*Milk, *Machines), (*Commerce, *West Germany), Mammals, Costs, Production, Economics, Consumption, Law, Agriculture, Preservation, Standards.

Content: Production, import, export and consumption values; Consuming areas; Competition; Import duties; Technical requirements; Domestic channels of distribution; Established trade practices; Products with particular market potential. (Author)
PB-174 777 HC$3.00 MF$0.65

METALWORKING EQUIPMENT IN THAILAND.
Coordination Center for Southeast Asian Studies, Bangkok (Thailand).
Sep 65, 23p
PB-173 709-Superseded. Prepared in cooperation th Business and Defense Services Administration, Washington, D. C. Rept. on Foreign Market Survey.

Descriptors: (*Metals, *Industrial equipment), (*Commerce, *Thailand), Roads, Economics, Standards, Metallurgy, Sheets, Machines, Industries, Costs, Sociology.

Content: Economic factors; Building expansion and road building; Rising standard of living; Promotional privileges; Sheet metal industry; Geographical spread of potential users; Growing importance of potential users; Market indications; Import figures; Sociological cultural factors. (Author)
PB-174 779 HC$3.00 MF$0.65

METAL CUTTING MACHINES IN MALAYA.
Far East Research Organisation Ltd., Singapore.
Sep 65, 31p
PB-173 710-Superseded. Prepared in cooperation with Business and Defense Services Administration, Washington, D. C. Rept. on Foreign Market Survey.

Descriptors: (*Metals, *Cutting), (*Commerce, *Malaya), Economics, Industries, Population, Costs, Law, Welding, Labor, Machines, Cutting tools, Machine tools, Lathes, Tables.

Content: Size of the market; Skilled and semi-skilled labour supplies; Number of buying targets; Attitudes to U.S. products in Malaysia; General criteria for purchasing in Malaysin; Distribution of new machines; Distribution of reconditioned machines; Sales approach; Credit terms; High demand items; Lathe in use. (Author)
PB-174 780 HC$3.00 MF$0.65

FOOD PRODUCE IN THAILAND.
Coordination Center for Southeast Asian Studies, Bangkok (Thailand).
Sep 65, 12p
PB-173 711-Superseded. Prepared in cooperation with Business and Defense Services Administration, Washington, D. C. Rept. on Foreign Market Survey.

Descriptors: (*Food, *Preservation), (*Commerce, *Thailand), Canning, Meat, Costs, Milk, Economics, Diet, Consumption, Standards, Industries, Law, Storage, Condiments, Vegetables, Labor, Cereals.

There are a number of food canneries and bottling plants operating in Bangkok; with the exception of the Government-owned German-equipped factory, they are operating either with antiquated or very primitive machinery. Pork, poultry, fish, beef are produced in abundance and their low prices constitute a major setback to imported food. Milk is available, but not in large enough quantities to satisfy demand. The staple food, rice, is produced in quantities large enough to export substantially. (Author)
PB-174 781 HC$3.00 MF$0.65

BOATING ACCESSORIES AND EQUIPMENT IN ITALY.
Gennaro (Pietro) e Associati, Milan (Italy).
Feb 66, 24p
PB-173 715-Superseded. Prepared in cooperation with Business and Defense Services Administration, Washington, D. C. Rept. on Foreign Market Survey.

Descriptors: (*Boats, *Italy), (*Commerce, Italy), Navigation, Economics, Navigational aids, Production, Costs, Marine engines, Law, Statistical data, Budgets.

Content: Introduction and research methods; Basic information: the motor craft industry in Italy; Import of nautical equipment and instruments; Potential market for boating accessories; Distribution channels and technical assistance; Factors conditioning the success of products imported from U.S.A.; Custom and import regulations. (Author)
PB-174 783 HC$3.00 MF$0.65

BOATING ACCESSORIES IN THE UNITED KINGDOM.
Comnrt Research Ltd., London (England).
Feb 66, 37p
PB-173 716-Superseded. Prepared in cooperation with Business and Defense Services Administration, Washington, D. C. Rept. on Foreign Market Survey.

Descriptors: (*Boats, *Great Britain), (*Commerce, Great Britain), Economics, Population, Costs, Marine engines, Periodic variations, Law, Production, Recreation, Statistical data.

Content: Measurement and classification of the market; The U. K. boat market; U. K. production and exports of boats and boating accessories; Role of imports in the market; Future trend in the market; Structure and attitudes of the trade; Structure of production; Structure of distribution; Seasonal variation in the trade; Attitudes in the trade; Basic attitude; Attitudes to imports, especially from USA; Attitudes towards the future; Prices; Factors affecting US participation in the market; Tariffs; Internal taxes; Other official restrictions; Other factors affecting US participation; The U. K. market; General prospects for US exports. (Author)
PB-174 784 HC$3.00 MF$0.65

AUTOMOTIVE MAINTENANCE EQUIPMENT IN THAILAND.
Business Research Ltd., Bangkok (Thailand).
Sep 65, 8p
PB-173 712-Superseded. Prepared in cooperation with Business and Defense Services Administration, Washington, D. C. Rept. on Foreign Market Survey.

Descriptors: (*Maintenance equipment, *Vehicles), (*Commerce, *Thailand), Economics, Machine tools, Standards, Industries, Machines, Costs, Law, Reports.

The study contains the market potential in Thailand for mechanical equipment and hand tools used in the testing and repairing of automotive equipment. No attempt has been made for a definitive survey outside the capital city, but motor vehicle registration figures for 1963 show three-fourths of the passenger cars and four-fifths of the taxis in the Kingdom licensed in Bangkok, while trucks, buses, and motorcycles are more likely to be registered up-country. The demand indicated from this survey, then, is likely to underestimate the amount of equipment required for heavy vehicles and motorcycles. Information was obtained from Thai Customs statistics, Police Department Annual Reports as published by the National Statistical Office, and from personal interviews with garage and fleet owners. (Author)
PB-174 785 HC$3.00 MF$0.65

CHILDREN'S CLOTHING IN ITALY.
Trancu (Theodore C.) and Associates, Milan (Italy).
Dec 65, 27p
PB-173 717-Superseded. Prepared in cooperation with Business and Defense Services Administration, Washington, D. C. Rept. on Foreign Market Survey.

Descriptors: (*Clothing, *Children), (*Commerce, *Italy), Economics, Textiles, Industries, Production, Law, Costs, Maps, Population, Organizations.

Content: Potential market for US-made clothes for children; Factors affecting the competitive ability of US-made clothes for children; Penetration of the market; Market indicators; Total size of the market.
PB-174 786 HC$3.00 MF$0.65

HOME MAINTENANCE EQUIPMENT AND SUPPLIES IN THE UNITED KINGDOM.
Comart Research Ltd., London (England).
Sep 65, 48p
PB-173 722-Superseded. Prepared in cooperation th Business and Defense Services Administration, Washington, D. C. Rept. on Foreign Market Survey.

Descriptors: (*Maintenance equipment, *Housing), (*Commerce, *Great Britain), Economics, Measurement, Costs, Industries, Classification, Money, Structural properties, Law, Structures.

Content: The market survey; Measurement and classification of the market; Factors affecting the market for home maintenance equipment; Size of market 1958 to 1962; Size of market 1963 to 1968; Structure of the industry; Concentration of firms in the industry; Distribution channels; Trade associations; Buying practices; Promotional activity by manufacturers; Hire purchase; Renting of equipment; Pricing information; Official restric-

tive measures; Factors affecting U.S. participation. (Author)
PB-174 788 HC$3.00 MF$0.65

STUDY OF COSTS OF PRODUCTION AND POTENTIAL FUTURE MARKETS FOR (PHASE I) LOW-BTU INDUSTRIAL FUEL-GAS (PRODUCER GAS) AND (PHASE II) INDUSTRIAL HYDROGEN.
Final rept.,
Battelle Memorial Inst., Columbus, Ohio. Columbus Labs.
H. W. Nelson, H. N. Layne, and G. M. Hein. 20 Jan 66, 137p
Contract 14-01-0001-474
Prepared in cooperation with Department of Interior, Washington, D. C. Office of Coal Research.

Descriptors: (*Coal gas, Economics), (*Fuels, Economics), (*Hydrogen, Economics), Industrial production, Costs, Commerce, Predictions, Coal tar, Natural resources, Chemical industry, Petroleum industry, Steel industry, Glass, Ceramic materials, Gas turbines, Distribution (Economics).

The report presents the results of a study of costs of production, uses, and potential future markets for industrial gases of two types. The objective of the Phase I portion of the study relates to producer gas and to the potential industrial markets that might at some time in the near future be obtained for this gas at predicfed costs of production, with desired gas characteristics, and with competitive aspects in relation to other available fuels. The analysis takes cognizance of the costs of production of producer gas as a factor in achieving markets, and in particular as to whether these markets can be served (1) by a hot, raw gas containing substantial amounts of tar and some solid carry-over material, as typified by the product gas from conventional producers available for some years; (2) by a gas containing tar in lesser amounts of changed character and less apt to lead to deposits in gas mains or on valves, burners, or controls, as might be obtained with use of a conceptual two-stage producer; or (3) by a cool, clean gas of reduced heating value from which the tar and solids had been removed from the gas of either a conventional or a conceptual producer in separators and scrubbing devices. The objective of the Phase II part of the study covers development of information concerning costs of production of available commercial processes for manufacturing industrial hydrogen, and estimates of the potential future markets for the gas. Factors related to determination of the costs of production included type of fuel, whether solid, liquid or gaseous, operating costs, capital costs, and the influence of degree of purity of the hydrogen and variations in plant capacity.
PB-174 835 HC$3.00 MF$0.65

5D. HISTORY, LAW, AND POLITICAL SCIENCE

TUNISIA: SPORTS AND EDUCATION,
American Univ Washington D C Center for Research in Social Systems
For primary bibliographic entry see Field 5K.
AD-652 731 HC$3.00 MF$0.65

AREA HANDBOOK FOR ECUADOR,
American Univ Washington D C Foreign Area Studies Div
For primary bibliographic entry see Field 8F.
AD-653 025 MF$0.65

SOME PATTERNS IN THE HISTORY OF VIOLENCE,
Rand Corp Santa Monica Calif
Frank H. Denton, and Warren Phillips. Jun 67, 33p Rept no. P-3609

Descriptors: (*Warfare, Statistical analysis), History, Political science, Probability, Statistical data, Theory.

The paper is aimed at describing systematic trends in the violence between political groups. The report is in two parts. Part one describes the formulation of an empirical test for the existence of (1) a short (15-30 year) term and (2) a long (80-120 year) term periodic fluctuation in the historical occurrence of war. The research described in part one is based, largely, on empirical (versus theoretical) generalizations. That is, not much concern is given to the 'why' of such patterns. The second part of the paper speculates about several possible reasons for these patterns. (Author)
AD-653 175 HC$3.00 MF$0.65

5E. HUMAN FACTORS ENGINEERING

INFLUENCE OF TIME ON TASK AND FALSE INFORMATION ON EFFICIENCY OF RESPONDING TO PURE TONES,
Army Medical Research Lab., Fort Knox, Ky.
Michel Loeb, and E. A. Schmidt. 5 Jul 60, 12p
USAMRL-426

Descriptors: (*Response, *Hearing), (*Physiology, Auditory perception), Responses, Reaction (Psychology), Performance tests, Time studies.

The object of the report is to determine whether responses to faint and moderately loud, simple, infrequent auditory stimuli may be maintained over a period of time and whether simulated knowledge of results may be used to maintain performance. Reaction time for randomly presented pure tones tended to increase as time on task increased. Failures to respond occurred at low intensities, but did not vary as a function of time on task. These omissions were reduced and reaction time to faint stimuli was lessened by a condition in which the experimenter pretended to give the subject information regarding his performance. The tendency for reaction time to intense stimuli to increase as a function of time on task was apparently inhibited when simulated knowledge of results was given. (Author)
AD-240 002 HC$3.00

ARMY ACCIDENT REPORTING. RESULTS OF SOME EXPLORATORY INTERVIEWS.
George Washington Univ., Alexandria, Va. Human Resources Research Office.
For primary bibliographic entry see Field 13L.
AD-488 404 HC$3.00 MF$0.65

DESIGNER'S GUIDE FOR EFFECTIVE DEVELOPMENT OF AEROSPACE GROUND EQUIPMENT CONTROL PANELS.
Final rept., 1 Feb 64-30 Apr 65,
Bunker-Ramo Corp., Canoga Park, Calif. Systems Effectiveness Dept.
David Meister, and Donald E. Farr. Sep 66, 130p
AMRL-TR-66-29
Contract AF 33 (615)-1350
Report on project Checkout and Hazard Control Techniques.

Descriptors: (*Control panels, Design), (*Human engineering, Control panels), Man-machine systems, Maintainability, Reliability, Display systems, Spacecraft components, Ground support equipment, Operators (Personnel).

This guide was developed for use by the practicing designer. It contains a discussion of the system factors to be considered in designing Aerospace Ground Equipment control panels (Part I), a form (the Design Information Worksheet) to gather and present design information (Part II), steps to be followed in control panel design (Part III), and a listing of control/display technology presently available to designers (Part IV). Particular attention has been paid to the information necessary to analyze panel requirements and to the design implications of human engineering requirements.
AD-646 443 HC$3.00 MF$0.65

HUMAN FACTORS IN THE DESIGN OF ELECTROLUMINESCENT DISPLAYS FOR AEROSPACE EQUIPMENT
Final rept., 1 May 65-1 May 66,
Antioch Coll., Yellow Springs, Ohio. Behavior Research Lab.
Herbert H. Stenson. Sep 66, 38p
AMRL-TR-66-130
Contract AF 33 (615)-1086
Report on projects Human Performance in Advanced Systems, and Criteria for the Design and Arrangement of Displays.

Descriptors: (*Display systems, Design), (*Electroluminescence, Display systems), Human engineering, Performance (Human), Vision, Lighting equipment, Visual perception, Luminescence, Spacecraft components.

The report presents an outline of a broad program of psychological research that will provide human engineering standards for the design of electroluminescent (EL) display devices. The physical characteristics of EL lighting are discussed, after which the possible types of EL displays are categorized as discrete or continuous displays, and as dynamic or static displays. Five types of perceptual tasks that might be required of an observer of an EL display are described, and each display category is then discussed in terms of the perceptual task (s) required to monitor the display in question. For each display-task combination, human factor research is proposed and some experiments are laid out in detail. The conventional variables such as intensity, contrast and viewing duration are considered for each display-task category as well as some less familiar variables based on the use of information theory. Examples of existing and proposed EL displays are given in connection with the proposed research.
AD-646 459 HC$3.00 MF$0.65

A STUDY OF VISUAL SEARCH USING EYE MOVEMENT RECORDINGS.
Annual rept. no. 2, 1 Jan 66-31 Mar 67,
Honeywell Inc St Paul Minn Systems and Research Div
L. G. Williams. 28 Mar 67, 77p Rept no. 12009-IR-3
Contract Nonr-4774 (00)

Descriptors: (*Target discrimination, *Human engineering), Display systems, Experimental design, Search theory, Colors, Psychophysics.

The report discusses two experimental investigations, one on the effect of target-size specification, the other on the effect of color specification. It was found that when the size of the target was specified to the searcher, the likelihood of a fixation falling on an object in the search field depended almost entirely on the ratio of the specified target size to the object size. The likelihood of fixation was found to be essentially independent of the range of object sizes in the field, the average size of the objects, the number of different-sized objects, or the lightness of the objects in the field. The largest objects in the field were discriminated better than other sizes. Other differences between sizes were minor. It was found that the discrimination gradient for colors was approximately the same throughout the Munsell color space. In particular, when searching for a target of given color, subjects were 50 percent as likely to fixate objects of different color which is: 5 Munsell hue units removed from the target; or 1 Munsell lightness unit removed from the target; or 3 Munsell chroma units removed from the target. These results, together

with data previously obtained, provide a data base for predicting search times for targets in complex fields in the general case. (Author)
AD-652 735 HC$3.00 MF$0.65

STUDIES IN RESEARCH METHODOLOGY. VII. THE CENTRAL LIMIT EFFECT FOR TWO DOZEN POPULATIONS AND ITS CORRELATION WITH POPULATION MOMENTS.
Aerospace Medical Research Labs Wright-Patterson AFB Ohio
For primary bibliographic entry see Field 12A.
AD-653 189 HC$3.00 MF$0.65

DESIGN OF AN OPTOMETER AND TWO-DIMENSIONAL EYE TRACKER FINAL REPORT.
Stanford Research Inst., Menlo Park, Calif.
For primary bibliographic entry see Field 6L.
For abstract, see STAR 05 14.
N67-26588 HC$3.00 MF$0.65

5G. LINGUISTICS

THE GENERAL PROPERTIES OF LANGUAGE,
Massachusetts Inst of Tech Cambridge Research Lab of Electronics
Noam Chomsky. 1967, 16p
Contract DA-36-039-AMC-03200 (E), Grant NsG-496
Availability: Published in Brain Mechanisms Underlying Speech and Language p73-88 1967.

Descriptors: (*Language, *Learning), Verbal behavior, Brain, Bionics, Social communication, Animals, Linguistics, Semantics.

A comparison is made between animal and human communication systems. The systems are discussed in terms of their purpose, information, and structure.
AD-652 899 Not available from CFSTI.

A PHONOLOGICAL RULE OF GREEK,
Massachusetts Inst of Tech Cambridge
Paul Kiparsky. 1967, 30p
Contract DA-36-039-AMC-03200 (E), Grant NSF-GP-2495
Research supported in part by National Institutes of Health, Grant MH-04737-05, National Aeronautics and Space Administration, Grant NsG-496, and the U. S. Air Force, Contract AF 19 (628)-2487.
Availability: Published in Glotta Zeitschrift fuer Griechische und Lateinische Sprache v44 n3/4 p109-34 1967.

Descriptors: (*Greece, *Language), (*Phonetics, *Semantics), Linguistics, Sound, Grammars, Syntax, Environment, Documentation, Handbooks, Anomalies.

The main concern of this study has not been to propose a series of solutions to various morphological problems of Greek. For the taking of individual phonemes, morphemes, words and 'constructions' as the primary object of study seems as sterile a pursuit as the corresponding approach would be in synchronic linguistics. What has been discussed here is accordingly rather the evidence for a proposed Greek innovation, its relative chronology among the other innovations whereby proto-Indo-European became Greek. It follows from this orientation that the paper will to a certain extent have to be judged right or wrong as a whole. Almost all analyses here presented have a bearing on each other.
AD-652 900 Not available from CFSTI.

TWO-WAY LANGUAGES,
Massachusetts Inst of Tech Cambridge Research Lab of Electronics
G. H. Matthews. 31 Jan 66, 9p
Contracts DA-36-039-AMC-03200 (E), AF 19 (628)-2487
Availability: Published in Information and Control v10 n2 p111-9 Feb 1967.

Descriptors: (*Grammars, Analysis), Language, Context free grammars, Vocabulary.

The paper investigates the effects of placing restrictions on the derivations of unrestricted rewriting systems.
AD-652 902 Not available from CFSTI.

ALGEBRAIC, RATIONAL AND CONTEXT-FREE POWER-SERIES IN NON-COMMUTING VARIABLES.
Technical rept.,
Hebrew Univ Jerusalem (Israel)
Eliahu Shamir. Jan 67, 20p Rept no. TR-25
Contract N62558-4695

Descriptors: (*Context free grammars, Israel), (*Power series, Polynomials), Symbols, Language, Syntax, Programming languages, Rings (Mathematics), Topology, Matrix algebra, Theorems.

The classes of algebraic and rational power-series on non-commuting variables are introduced as the solutions of certain polynomials systems. These systems can be viewed as context-free grammars with weighted productions - the weights being taken from a ring. This observation is used to derive basic properties of those classes of power-series.
AD-653 262 HC$3.00 MF$0.65

THE INFLUENCE OF SENTENCE STRUCTURE ON THE READING PROGRESS.
Technical rept.,
Hebrew Univ Jerusalem (Israel)
I. M. Schlesinger. Oct 66, 288p Rept no. TR-24
Contract N62558-4695

Descriptors: (*Reading, *Grammars), Linguistics, Transformational grammars, Acceptability, Performance (Human), Syntax, Israel.
Identifiers: Psycholinguistics.

It was assumed that the human user of language incorporates a device which operates along the lines of a generative grammar. Accordingly, experiments were conducted on the psychological reality of the syntactical constituent and the behavioral effects of grammatical transformations and of sentence complexity. Other syntactic variables investigated were sentence length and the relative positions of a pronoun and the noun to which it refers. Methodological problems of readability research are also discussed. (Author)
AD-653 263 HC$3.00 MF$0.65

THE DEFINABILITY OF CARDINAL NUMBERS.
Hebrew Univ Jerusalem (Israel)
For primary bibliographic entry see Field 12A.
AD-653 298 HC$3.00 MF$0.65

SPEECH RESEARCH.
Haskins Labs New York
For primary bibliographic entry see Field 17B.
AD-653 373 HC$3.00 MF$0.65

5H. MAN-MACHINE RELATIONS

DESIGNER'S GUIDE FOR EFFECTIVE DEVELOPMENT OF AEROSPACE GROUND EQUIPMENT CONTROL PANELS.
Bunker-Ramo Corp., Canoga Park, Calif. Systems Effectiveness Dept.
For primary bibliographic entry see Field 5E.
AD-646 443 HC$3.00 MF$0.65

GRAPHICS.
Massachusetts Inst of Tech Lexington Lincoln Lab
For primary bibliographic entry see Field 9B.
AD-653 191 HC$3.00 MF$0.65

VALIDATION OF THE DEI TECHNIQUE FOR LARGE-SCALE DISPLAY EVALUATION.
Applied Psychological Services Wayne Pa
For primary bibliographic entry see Field 5J.
AD-653 209 HC$3.00 MF$0.65

EXPERIMENTAL INVESTIGATIONS OF MAN-MACHINE PROCESSING OF INFORMATION, VOLUME I.
General Dynamics Corp Groton Conn Electric Boat Div
For primary bibliographic entry see Field 17A.
AD-653 278 HC$3.00 MF$0.65

MEASUREMENT OF LOW FREQUENCY VIBRATIONS IN BIG HELICOPTERS AND THEIR TRANSMISSION TO THE PILOT.
Mesure des Vibrations de Basse Frequence Sur Helicoptere Lourd Et Leur Transmission Au Pilote
National Aeronautics and Space Administration, Washington, D. C.
R. Auffret, and H. Seris. May 67, 16p NASA-TT-F-471
Transl. Into English From the Book "agard Collected Papers Presented At the 22nd Meeting of the Agard Aerospace Medical Panel" Sep. 1965 P 245-257

Descriptors: *Human tolerance, *Low frequency, *Pilot performance, *Vibration effect, Atmospheric, Cockpit, Cranium, Damping, Effect, Helicopter, Human, Measurement, Mechanical, Performance, Pilot, Resonance, Rotation, Rotor, Seat, Sternum, Tolerance, Turbulence, Vibration.

For abstract, see STAR 05 14.
N67-26599 HC$3.00 MF$0.65

AN INFORMATION MODEL OF THE EXTRA-VEHICULAR DYNAMICS OF COSMONAUT BODY MOVEMENTS AND SPATIAL ORIENTATION.
Informatsionnaya Model'dinamiki Dvizheniya I Prostranstvennaya Orientirovka Kosmonavta Vne Korablya
National Aeronautics and Space Administration, Washington, D. C.
V. A. Popov, YU. A.Rozanov, and M. M. Silvestrov. Nov 66, 7p NASA-TT-F-10407
Transl. Into English From Russian Presented At the 17th Intern. Astronautical Cong., Madrid, 9-15 Oct. 1966

Descriptors: *Astronaut performance, *Extravehicular operation, *Spatial orientation, Astronaut, Body, Control, Instrument, Movement, Orientation, Performance, Rotation, Spatial, Stabilization.

For abstract, see STAR 05 14.
N67-26626 HC$3.00 MF$0.65

AN EXPERIMENTAL INVESTIGATION OF TWO VISUAL METHODS OF ALTITUDE DETERMINATION.
National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
J. H. Lichtenstein, and W. T. Suit. May 67, 30p
NASA-TM-X-1392

Descriptors: *Altitude control, *Spacecraft orbit, *Visual task, Altitude, Arc, Astronaut, Control, Curvature, Determination? Field, Horizon, Lunar, Matching, Navigation, Orbit, Photography, Spacecraft, Surface, Task, Technique, Visual.

For abstract, see STAR 05 14.
N67-27266 HC$3.00 MF$0.65

51. PERSONNEL SELECTION, TRAINING, AND EVALUATION

DETERMINATION OF COMBAT JOB REQUIREMENTS FOR ARMORED CAVALRY PLATOON PERSONNEL.
Technical rept.,
George Washington Univ., Alexandria, Va. Human Resources Research Office.
William L. Warnick, and Robert A. Baker. Dec 64, 129p TR-92
Contract DA-44-188-ARO-2

Descriptors: (*Armored vehicles, Job analysis), Military training, Military requirements, Military personnel, Performance (Human), Research program administration.
Identifiers: Armored Cavalry.

The objectives of this research were to formulate the job requirements of personnel assigned to armored cavalry platoons and find out the importance in combat of each job in order to know which skills should be emphasized during training. Field personnel rated prepared lists of platoon personnel job requirements for their importance in combat. Final lists included only the duties and skills the field personnel rated essential for combat or for basic performance of the job. The lists are felt to be useful for giving students a preview of their jobs, evaluating platoon efficiency, diagonosing and correcting deficiencies, and developing and standardizing proficiency tests for armor schools, training establishments, and armored cavalry units. (Author)
AD-455 302 HC$3.00

RADAR TARGET DETECTION AS INFLUENCED BY EXPERIENCE AND TRAINING.
George Washington Univ., Alexandria, Va. Human Resources Research Office.
For primary bibliographic entry see Field 17I.
AD-455 767 HC$3.00

PROGRAMED INSTRUCTION AND LOW ALTITUDE AERIAL OBSERVATION.
Research rept.,
George Washington Univ., Alexandria, Va. Human Resources Research Office.
Peter B. Dawkins. Dec 64, 59p RR-14
Contract DA-44-188-ARO-2

Descriptors: (*Teaching machines, Target recognition), Army, Aerial photographs, Instruction manuals, Low altitude, Maps, Training devices, Military tra ining.
Identifiers: Aerial observers.

An army training course on low altitude observation was converted into programed format. The programed content consisted of both verbal and visual (i.e., photographs and maps) material, on four basic aerial observer skills. Criterion testing O G on target location indicated that the group of students receiving the experimental training made reliable learning gains, in comparison with a control group which did not receive the training. A reduction in time required to locate targets accompanied the increase in accuracy. On the average, study time for the selfpaced programed course was less than that required for the classroom version of the course (15 hours vs. 16 hours). (Author)
AD-456 738 HC$3.00

EXAMPLES OF CROSS-CULTURAL PROBLEMS ENCOUNTERED BY AMERICANS WORKING OVERSEAS: AN INSTRUCTOR'S HANDBOOK,
George Washington Univ., Alexandria, Va. Human Resources Research Office.
For primary bibliographic entry see Field 5K.
AD-465 043 HC$3.00 MF$0.65

A COMPARISON OF WHOLE VERSUS PART METHODS OF MARKSMANSHIP TRAINING,
George Washington Univ., Alexandria, Va. Human Resources Research Office.
F. J. McGuigan, and Eugene F. MacCaslin. May 54, 44p
Availability: Microfiche only after original copies are exhausted.

Descriptors: (*Small arms, Teaching methods), (*Automatic weapons, Teaching methods), Military training, Gunnery, Army training, Effectiveness, Firing tests (Ordnance).
Identifiers: M-1 Guns (Cal .30), Marksmanship.

The experiment tested two methods of M1 rifle instruction. One group of Infantry basic trainees was taught by the Army Training Program step-by-step method, another by a whole method. In the first period of whole method rifle instruction, the trainee saw a demonstration of the entire sequence of movements entering into the complete act of firing (use of the sling, firing positions, trigger squeeze, etc.). In each subsequent period, he practiced all these movements, including actual firing. The results show in general that the experimental whole method is more effective than the ATP method. On the average: (1) the trainees taught by the whole method made much higher scores for slow fire; they showed a 61% greater improvement over initial slow fire proficiency than did those taught by the ATP method; (2) the more intelligent trainees taught by the whole method made higher scores for sustained fire; and (3) these findings are consistent with further data from a firing test given nearly two months later, indicating that the superiority of the whole method lasts over a long period of time. (Author)
AD-477 646 HC$3.00 MF$0.65

A PROCEDURAL GUIDE TO OPERATIONAL SEQUENCE ANALYSIS IN PERSONNEL RESEARCH.
Research memo.,
Naval Personnel Research Activity, San Diego, Calif.
David A. Wilson. Jan 66, 40p SRM-66-19

Descriptors: (*Personnel management, Instruction manuals), Man-machine systems, Navy, Reports, Handbooks, Standards, Management planning, Job analysis, Operation, Research program administration, Systems engineering, Performance (Human).
Identifiers: OSD (Operational Sequence Diagrams).

The report is intended to provide investigators and planners who construct and use Operational Sequence Diagrams (OSD) with useful background information, resource material, and procedural guidance. The OSD proved to be an effective tool of analysis in the development of Navy man-machine systems. The many different approaches, formats, and styles which have emerged have caused both analysts and those who use their product some difficulty in understanding and utilizing OSDs. It appears that operational sequence analysis has not yet been fully exploited in the field of personnel research. Certain standardization of analytic procedure, format, and symbology is suggested in the interest of enhancing the utility of the product. It is not intended that such standardization limit the further development of operational sequence analysis as a personnel research procedure. The guidance in this report should aid Navy personnel planners in satisfying documentation requirements of cognizant divisions in each stage of system development. Reference to this guide should aid each user of OSDs to fully exploit the value of their content. (Author)
AD-477 767 HC$3.00 MF$0.65

DEVELOPMENT OF RESERVE OFFICER APTITUDE TEST FORMS 1 AND 2.
Naval Personnel Program Support Activity, Washington, D. C. Personnel Research Lab.
For primary bibliographic entry see Field 5J.
AD-479 819 HC$3.00 MF$0.65

TEAM PROCEDURES IN IMAGE INTERPRETATION.
Army Personnel Research Office, Washington, D. C.
For primary bibliographic entry see Field 14E.
AD-480 533 HC$3.00 MF$0.65

TUNISIA: SPORTS AND EDUCATION,
American Univ Washington D C Center for Research in Social Systems
For primary bibliographic entry see Field 5K.
AD-652 731 HC$3.00 MF$0.65

TRANSFER OF RESPONSE IN VISUAL RECOGNITION SITUATIONS AS A FUNCTION OF FREQUENCY VARIABLES,
Stanford Univ Calif
W. K. Estes, and Arnold Binder. 16 May 66, 28p
Contract Nonr-225 (73), Grant PHS-MH-02170
Prepared in cooperation with California Univ., Irvine.
Availability: Hardcopy available from American Psychological Association, Inc., 1200 17th Street, N. W., Washington, D. C. 20036 $1.50.

Descriptors: (*Reaction (Psychology), *Learning), (*Transfer of training, Identification), Visual perception, Probability, Sampling, Predictions, Psychometrics, Problem solving, Errors.

A series of 6 experiments investigated the principles required to account quantitatively for responses of human Ss to new combinations of cues following discrimination learning. In the training phase of each experiment, Ss learned to make identifying responses (numerical labels) to sets of stimuli (pairs of nonsense syllables) under a paired-associate procedure. After a fixed number of acquisition trials Ss were tested on stimulus compounds involving new combinations of the training cues. In all experiments a substantial proportion of variance in the test data was accounted for by a model embodying the additive rule and the probability matching rule of stimulus sampling theory. In cases when training had been conducted under standard discrimination paradigms, responses to test compounds were quite well accounted for by this model without auxiliary principles. Ss exhibited preferences for low ambiguity cues in test compounds only when this preference had been differentially reinforced during training. Under a variety of circumstances, predictions from the stimulus sampling model could be improved by the addition of a 'relative novelty' principle, sta ting that, other things being equal, Ss tend to sample from test compounds the cues that had occurred least frequently during previous training.
AD-652 768 Not available from CFSTI.

CHARACTERISTICS OF NAVY RDT/E OFFICERS WITH PH.D.'S.
Management analysis memo.,
Office of the Director of Defense Research and Engineering Washington D C Office for Laboratory Management
Milton Gussow. 1 Mar 67, 12p Rept no. MAM-67-1

Descriptors: (*Officer personnel, Navy), Psychology, Scientific personnel, Education, Electrical engineering, Engineering personnel, Management engineering, International law, Statistical data.

Tables show officers with Ph.D's performing work in RDT and E with information arranged by desig-

nator, rank and discipline. Also, the populations of technical officers with Ph.D.'s in all three Military Departments are compared in regard to rank structure.
AD-652 813 HC$3.00 MF$0.65

AN INVESTIGATION OF THE PROBLEM OF MECHANIZATION AND WORKER SECURITY IN THE MARITIME INDUSTRY-LONGSHOREMEN ASPECT.
Master's thesis,
Temple Univ Philadelphia Pa
Stephen Lewis. 1967, 123p

Descriptors: (*Labor unions, *Marine engineering), (*Shipping (Marine), Labor), Piers, Cargo, Handling, Personnel, Economics, Leadership, Management engineering, Costs.

Worker resistance to technological change should be expected in view of their bitter experience in the past with both employer and union groups alike. Psychologically, it cannot be expected that the workforce will be agreeable to change which might affect a change in those benefits they have fought so hard to acquire--whether the change be good or bad, it is the change itself that they would resist, either because of the real or imaginative problems it will create. Technological change will bring about a reduction in the manhours required to handle cargo movement. Recent studies have concluded that unitized handling, both pallets and containerization, will reduce longshore handling costs. This does not mean that the longshore industry will experience a reduction in the number of longshoremen required. The ILWU-PMA agreement concluded in 1960, which allowed for the introduction of technological improvements, has not resulted in a reduction of the workforce required. Indeed, longshoremen requirements have increased.
AD-652 977 HC$3.00 MF$0.65

HARBOR SURVEY ASSISTANCE PROGRAM CONDUCTED BY NAVOCEANO IN THE VICINITY OF PUERTO BARRIOS, GUATEMALA.
Naval Oceanographic Office Washington D C
For primary bibliographic entry see Field 17G.
AD-653 085 HC$3.00 MF$0.65

THE NONSYMMETRIC GAME: JOINT MAXIMUM, EFFICIENT SOLUTION AND MEASURES OF COLLUSION AND WELFARE,
Yale Univ New Haven Conn Cowles Foundation for Research in Economics
For primary bibliographic entry see Field 5C.
AD-653 087 HC$3.00 MF$0.65

AN ANNOTATED BIBLIOGRAPHY ON THE DESIGN OF INSTRUCTIONAL SYSTEMS.
Technical rept.,
George Washington Univ Alexandria Va Human Resources Research Office
Robert G. Smith, Jr. Lay 67, 140p Rept no. TR-67-5
Contract DA-44-188-ARO-2
See also AD-644 054.

Descriptors: (*Teaching methods, Bibliographies), Students, Learning, Performance (Human), Programmed instruction, Systems engineering, Training, Training devices, Indexes.

The bibliography is divided into seven major areas, each dealing with a different aspect of instructional system design: (1) Systems--General; (2) Training Systems; (3) Presentation of Knowledge; (4) Practice of Knowledge; (5) Practice of Performance; (6) Management of Students; and (7) Additional Material. The major areas are further divided into subtopics where appropriate. There are 449 annotated entries in the bibliography, dating from 1950 to 1965. Key-word-in-context (KWIC) and author indexes are included. (Author)
AD-653 128 HC$3.00 MF$0.65

SHORT COURSE ON ROADSIDE DEVELOPMENT (23rd).
Ohio State Univ., Columbus. Dept. of Landscape Architecture.
For primary bibliographic entry see Field 13B.
PB-174 802 HC$3.00 MF$0.65

SHORT COURSE ON HIGHWAY DEVELOPMENT (2nd).
Ohio State Univ., Columbus. Dept. of Landscape Architecture.
For primary bibliographic entry see Field 13B.
PB-174 803 HC$3.00 MF$0.65

SHORT COURSE ON HIGHWAY DEVELOPMENT (4th).
Ohio State Univ., Columbus. Dept. of Landscape Architecture.
For primary bibliographic entry see Field 13B.
PB-174 804 HC$3.00 MF$0.65

SHORT COURSE ON HIGHWAY DEVELOPMENT (7th).
Ohio State Univ., Columbus. Dept. of Landscape Architecture.
For primary bibliographic entry see Field 13B.
PB-174 805 HC$3.00 MF$0.65

SHORT COURSE ON HIGHWAY DEVELOPMENT (8th).
Ohio State Univ., Columbus. Dept. of Landscape Architecture.
For primary bibliographic entry see Field 13B.
PB-174 806 HC$3.00 MF$0.65

SHORT COURSE ON ROADSIDE DEVELOPMENT (9th).
Ohio State Univ., Columbus. Dept. of Landscape Architecture.
For primary bibliographic entry see Field 13B.
PB-174 807 HC$3.00 MF$0.65

SHORT COURSE ON HIGHWAY DEVELOPMENT (5th).
Ohio State Univ., Columbus. Dept. of Landscape Architecture.
For primary bibliographic entry see Field 13B.
PB-174 810 HC$3.00 MF$0.65

SHORT COURSE ON ROADSIDE DEVELOPMENT (6th).
Ohio State Univ., Columbus. Dept. of Landscape Architecture.
For primary bibliographic entry see Field 13B.
PB-174 811 HC$3.00 MF$0.65

SHORT COURSE ON ROADSIDE DEVELOPMENT (10th).
Ohio State Univ., Columbus. Dept. of Landscape Architecture.
For primary bibliographic entry see Field 13B.
PB-174 812 HC$3.00 MF$0.65

SHORT COURSE ON ROADSIDE DEVELOPMENT (11th).
Ohio State Univ., Columbus. Dept. of Landscape Architecture.
For primary bibliographic entry see Field 13B.
PB-174 813 HC$3.00 MF$0.65

SHORT COURSE ON ROADSIDE DEVELOPMENT (12th).
Ohio State Univ., Columbus. Dept. of Landscape Architecture.
For primary bibliographic entry see Field 13B.
PB-174 814 HC$3.00 MF$0.65

SHORT COURSE ON ROADSIDE DEVELOPMENT (13th).
Ohio State Univ., Columbus. Dept. of Landscape Architecture.
For primary bibliographic entry see Field 13B.
PB-174 815 HC$3.00 MF$0.65

SHORT COURSE ON ROADSIDE DEVELOPMENT (14th).
Ohio State Univ., Columbus. Dept. of Landscape Architecture.
For primary bibliographic entry see Field 13B.
PB-174 816 HC$3.00 MF$0.65

SHORT COURSE ON ROADSIDE DEVELOPMENT (15th).
Ohio State Univ., Columbus. Dept. of Landscape Architecture.
For primary bibliographic entry see Field 13B.
PB-174 817 HC$3.00 MF$0.65

SHORT COURSE ON ROADSIDE DEVELOPMENT (16th).
Ohio State Univ., Columbus. Dept. of Landscape Architecture.
For primary bibliographic entry see Field 13B.
PB-174 818 HC$3.00 MF$0.65

SHORT COURSE ON ROADSIDE DEVELOPMENT (17th).
Ohio State Univ., Columbus. Dept. of Landscape Architecture.
For primary bibliographic entry see Field 13B.
PB-174 819 HC$3.00 MF$0.65

SHORT COURSE ON ROADSIDE DEVELOPMENT (18th).
Ohio State Univ., Columbus. Dept. of Landscape Architecture.
For primary bibliographic entry see Field 13B.
PB-174 820 HC$3.00 MF$0.65

SHORT COURSE ON ROADSIDE DEVELOPMENT (19th).
Ohio State Univ., Columbus. Dept. of Landscape Architecture.
For primary bibliographic entry see Field 13B.
PB-174 821 HC$3.00 MF$0.65

SHORT COURSE ON ROADSIDE DEVELOPMENT (24th).
Ohio State Univ., Columbus. Dept. of Landscape Architecture.
For primary bibliographic entry see Field 13B.
PB-174 825 HC$3.00 MF$0.65

5J. PSYCHOLOGY (INDIVIDUAL AND GROUP BEHAVIOR)

SOME EFFECTS OF ANESTHETIZING THE ARTICULATORS UNDER CONDITIONS OF NORMAL AND DELAYED SIDE-TONE,
Naval School of Aviation Medicine, Pensacola, Fla.
For primary bibliographic entry see Field 17B.
AD-119 605 HC$3.00

A STUDY OF AUDITORY FATIGUE CAUSED BY HIGH-INTENSITY ACOUSTIC TRANSIENTS,
Bolt Beranek and Newman, Inc., Cambridge, Mass.

Michael H. L. Hecker, and Karl D. Kryter. 15 Oct 64, 42p BBN-1158
Contract DA-49-007-MD-985

Descriptors: (*Auditory perception, Thresholds (Physiology)), (*Ear, Auditory perception), Fatigue (Physiology), Audiometry, Psychophysiology, Acoustics, Spectrum analyzers, Behavior, Intensity, Analysis of variance.

An experiment is described in which groups totaling 21 subjects were exposed to 100, 200, and 400 acoustic impulses that were presented at the rate of 1 impulse/sec and at a peak intensity of 157 dB SPL. The impulse waveform featured a rise time of 0.25 msec and a positive pressure phase of 0.50 msec. Less TTS2 was observed for these impulses than was reported by Carter and Kryter under comparable conditions for impulses having a longer rise time and a longer positive pressure phase. The variability of TTS2 obtained in the present experiment, representing individual differences in susceptibility, was found to be similar to the variability reported by Carter and Kryter. In addition to these topics, questions pertaining to the effects on TTS2 of impulse repetition rate, number of impulses presented, and impulse intensity are also discussed. (Author)
AD-450 707 HC$3.00

ORTHOGONAL INTER-BATTERY FACTOR ANALYSIS.
Technical rept.,
Educational Testing Service, Princeton, N. J.
Walter Kristoff. Sep 65, 50p RB-65-29
Contmct Nonr-2752 (00)

Descriptors: (*Factor analysis, Statistical tests), Theorems, Numerical analysis, Matrix algebra, Transformations (Mathematics), Psychometrics.

It is the purpose of this paper to present a method of analysis for obtaining (1) inter-battery factors and (2) battery specific factors for two sets of tests when the complete correlation matrix including communalities is given. In particular, the procedure amounts to constructing an orthogonal transformation such that its application to an orthogonal factor solution of the combined sets of tests results in a factor matrix of a certain derired form. The factors isolated are orthogonal but may be subjected to any suitable final rotation, provided the above classification of factors into (1) and (2) is preserved. The general coordinate-free solution of the problem is obtained with the help of methods pertaining to the theory of linear spaces. The actual numberical analysis determined by the coordinate-free solution turns out to be a generalization of the formalism of canonical correlation analysis for two sets of variables. A numerical example is provided. (Author)
AD-472 122 HC$3.00 MF$0.65

AVOIDANCE OF COMMITMENT AND NEED FOR CLOSURE AS DETERMINANTS OF BEHAVIOR IN DECISION SITUATIONS.
Research rept.,
George Washington Univ., Alexandria, Va. Human Resources Research Office.
Richard Snyder, and Judson Mills. Jun 63, 25p RR-12
Contract DA-44-188-ARO-2

Descriptors: (*Decision making, Behavior), Motivation, Uncertainty, Military psychology, Performance (Human), Theory, Decision theory, Statistical analysis.

Investigation was made of behavior in decision situations involving choice among mutually exclusive alternatives, in which action did not necessarily have to be taken. Three hypotheses were tested which concerned the influence of certain variables upon the tendency to avoid commitment to a specific course of action. Choices were recorded by subjects in a four-part questionnaire. Results were analyzed in terms of several variables and their experimental manipulations. It was concluded that a subject, in a situation in which he does not need to take action in order to know the outcome, will not be likely to express his real preference unless that preference is strong. (Author)
AD-478 519 HC$3.00 MF$0.65

DEVELOPMENT OF RESERVE OFFICER APTITUDE TEST FORMS 1 AND 2.
Final rept.,
Naval Personnel Program Support Activity, Washington, D. C. Personnel Research Lab.
Aron Katz, and L. Harold Sharp. Mar 66, 25p WTB-66-2

Descriptors: (*Aptitude tests, Officer personnel), (*Test construction (Psychology), Aptitude tests), Performance (Human), Armed forces reserves, Performance tests, Leadership, Selection, Standardization, Reliability, Naval personnel, Mathematical prediction, Correlation techniques.

The report describes the development of two parallel forms of the Reserve Officer Aptitude Test (ROAT Forms 1 and 2) to replace the Reserve Officer Candiuate Selection Test (ROCST Forms 3 and 4) and Contract Student Selection Test (CSST Forms 3 and 4) currently used in the selection of applicants for the ROC and NROTC Contract programs, respectively. The method used in developing norms and the results of correlational analysis ensure that ROAT Forms 1 and 2 are not only satisfactorily reliable and valid for predicting success in the ROC Program, but sufficiently equivalent in these and other essentials to warrant their operational use interchangeably, in place of ROCST Forms 3 and 4, in the selection of applicants for the ROC Program. In view of this and the similarity in the general ability and educational levels of NROTC Contract applicants to ROC applicants, ROAT Forms 1 and 2 are suitable for operational use, in place of CSST Forms 3 and 4, in the selection of applicants for the NROTC Contract Program. (Author)
AD-479 819 HC$3.00 MF$0.65

PITCH MEMORY FOR NEAR THRESHOLD STIMULUS DIFFERENCES.
Technical bulletin,
Naval Personnel Research Activity, San Diego, Calif.
E. G. Aiken, and A. W. Lau. Apr 66, 14p STB-66-28

Descriptors: (*Pitch discrimination, *Sonar personnel), Memory, Psychoacoustics, Doppler effect, Sonar pulses, Reliability, Errors, Echo ranging, Mathematical prediction, Thresholds (Physiology), Performance (Human).

The increasing range of active sonar contacts raises questions concerning the ability of the operator to detect very small amounts of Doppler, when the reverberation and echo are separated in time. To get some data relevant to this problem, an investigation of memory for the pitch of a short duration pure tone pulse was conducted. Utilizing an 800 cps standard stimulus with comparison stimulus separations of 0, plus or minus 3, plus or minus 4, plus or minus 5 cps, discriminability and constant error measures were taken with .95, 4.5, and 8.9 sec interstimulus separations. The data justify the following conclusions: (1) pitch discrimination shows no reliable change over the interval from .95 to 8.9 sec; (2) the nature of the incorrect responses indicates an increasing willingness to report a pitch difference as the interstimulus interval increases; (3) a bias in reporting more lower than higher pitch differences at the .95 sec interval reverses at 4.5 sec, and is absent at 8.9 sec; (4) the data are consistent with much previous research involving pure tone discrimination, and with most of the data on Doppler discrimination employing sonar stimulus materials. It is inferred that no decline in near threshold Doppler judgments is likely up to about a 9 sec separation between reverberation and echo. However, specific training against high and low Doppler response biases at certain time separations is indicated.
AD-482 390 HC$3.00 MF$0.65

USE OF THE OPERATIONAL FLIGHT TRAINER.
Technical rept.
Naval Training Device Center, Port Washington, N. Y.
1966, 72p NAVTRADEVCEN-1734-00-1

Descriptors: (*Instructors, Flight simulators), (*Pilots, Training devices), Naval personnel, Human engineering, Performance (Human), Costs, Cockpits, Flight instruments, Navigational aids.

In order to improve design from an instructional standpoint, an analysis was made of instructor activity in operational flight trainers. A steering committee consisting of engineers, training specialists, maintenance and requirements personnel recommended that the study concentrate on the F9F-5 and P2V-5 operational flight trainers as typical. These trainers were studied both in the training command and in fleet training in terms of current utilization and in terms of a maximum utilization program. This latter was defined as a training regime composed of a set of problems using the full training potential of the device. This was seen as having important design implications if using the trainer at its full potential saturates the instructor.
AD-643 498 HC$3.00 MF$0.65

PSYCHOLOGICAL STUDIES OF ADVANCED NAVAL AIR TRAINING: EVALUATION OF OPERATIONAL FLIGHT TRAINERS.
Technical rept.,
Psychological Corp., New York.
W. R. Mahler, and G. K. Bennett. 1 Sep 50, 156p SPECDEVCEN-999-1-1
Contract N9onr-999 (01)
Limited number of copies containing color other than black and white are available until stock is exhausted. Reproductions will be made in black and white.

Descriptors: (*Transfer of training, Military personnel), (*Pilots, Flight simulators), Training planes, Design, Costs, Military training, Learning, Psychology.

The report presents the results of an experimental study conducted at the Naval Air Advanced Training Command at Corpus Christi, Texas. The study was initiated in October, 1949 to provide information on the following questions: Can flight time be raved by the use of Operational Flight Trainers (OFTs); Can the proficiency of the student be improved by the use of OFTs; How can OFTs be used effectively; From a design standpoint, what characteristics of an OFT seem most essential. Because of the numerous variables interacting in this complex situation, a controlled experiment was established to secure the required information. Two trainers were used, the PBM (two-engine seaplane) and the PB4Y (four-engine land plane) Operational Flight Trainers. A review of previous studies in this area, discussion of the problem, description of the training situation, the experimental design, the training syllabi, and the grading system are provided in the report.
AD-643 499 HC$3.00 MF$0.65

RECOVERY FROM IMPULSE NOISE INDUCED ACOUSTIC TRAUMA.
Army Medical Research Lab., Fort Knox, Ky. Experimental Psychology Div.
For primary bibliographic entry see Field 6E.
AD-645 898 HC$3.00 MF$0.65

THE ROLE OF TRIAL IN THE ACCEPTANCE AND ADOPTION OF NEW EQUIPMENT: A REVIEW AND SUMMARY.
Final rept.,
Life Sciences, Inc., Fort Worth, Tex.
P. K. Berger, W. G. Matheny, and C. E. Newmiller. Aug 66, 69p TR-66-1
Contract Nonr-4097 (00)

Descriptors: (*Machines, Acceptability), (*Military personnel, *Adjustment (Psychology)), Attitudes, Display systems, Altimeters, Analysis of variance, Psychometrics.
Identifiers: Innovation (Technology).

The report reviews three experiments and a substantial amount of related research literature concerned with the acceptance of innovations. The particular aim of the review is to consolidate information describing how trial usage or exposure can exhance the acceptability of new equipment developed for military utilization. The relations of individual differences to acceptance and adoption processes also are discussed. It is concluded that studies of acceptance behavior tend to be excessively restricted to specific products, personnel and situations. A more fruitful approach is believed to lie in systematic examinations of the acceptance-rejection processes and personal, attitudinal, and group variables which affect innovativeness. (Author)
AD-646 360 HC$3.00 MF$0.65

HUMAN FACTORS IN THE DESIGN OF ELECTROLUMINESCENT DISPLAYS FOR AEROSPACE EQUIPMENT.
Antioch Coll., Yellow Springs, Ohio. Behavior Research Lab.
For primary bibliographic entry see Field 5E.
AD-646 459 HC$3.00 MF$0.65

SOME OBSERVATIONS AND MEASUREMENTS OF THE PULFRICH PHENOMENON.
Army Medical Research Lab Fort Knox Ky
For primary bibliographic entry see Field 6L.
AD-652 705 HC$3.00 MF$0.65

THE RELATION OF INDUCED TINNITUS TO PHYSICAL CHARACTERISTICS OF THE INDUCING STIMULI.
Interim rept.,
Army Medical Research Lab Fort Knox Ky
Michel Loeb, and Richard P. Smith. 10 May 67, 14p
USAMRL-729

Descriptors: (*Audiometry, Test methods), Hearing, Pathology, Pitch discrimination, Psychoacoustics, Thresholds (Physiology), Deafness, Psychophysics, Auditory acuity.

After observers were expored to intense pure tone and broad band acoustic stimuli, their temporary threshold shifts were measured, and they were asked to match the pitch of any resulting tinnitus by manipulating the frequency of an adjustable low-level pure tone in the opposite ear. It was found that both the frequency of tinnitus and the f..quency of the tone used for the pitch match increased as the frequency of the traumatic stimulus increased, but maximum loss frequency and tinnitus frequency did not coincide. Although the observers were quite reliable in their judgments of tinnitus elicited by a stimulus, inter-observer variability was considerable. (Author)
AD-652 706 HC$3.00 MF$0.65

TRANSFER OF RESPONSE IN VISUAL RECOGNITION SITUATIONS AS A FUNCTION OF FREQUENCY VARIABLES,
Stanford Univ Calif
For primary bibliographic entry see Field 5I.
AD-652 768 Not available from CFSTI.

PITCH OF A PERIODICALLY INTERRUPTED TONE,
Ohio State Univ Research Foundation Columbus
Elca Swigart. 1966, 9p Rept no. 108
Contract Nonr-495 (18)
Availability: Published in The Journal of the Acoustical Society of America v40 n5 p1180-5 Nov 1966.

Descriptors: (*Auditory perception, *Sound pitch), Periodic variations, Hearing, Auditory signals, Performance tests.

A series of tone pulses was produced by periodically interrupting a 1000-Hz tone (carrier frequency). Each interruption was 1 msec (one wavelength of the carrier frequency). The duration of the tone pulses was varied by increasing or decreasing the interruption rate. Listeners matched continuous tones to the interrupted tone under three conditions: (1) binaurally at a low intensity, (2) monaurally at a low intensity, and (3) monaurally at a high intensity. Results show that the stimuli that elicited responses corresponding to the carrier frequency contained individual pulses of longer duration than those stimuli which elicited matches to the interruption rate. Comparison of the duration of individual pulses of interrupted tones with the duration of tone 'pips' in studies relating pitch to tonal duration revealed similarities in the stimulus duration necessary to detect the pitch of the carrier frequency. Order of presentation of stimuli significantly affected responses. Listeners receiving the stimuli in an ascending order (tone pulses of shorter to longer duration) required pulses of longer duration to respond to the carrier frequency than did listeners receiving the stimuli in a descending order. (Author)
AD-652 784 Not available from CFSTI.

EFFECTS OF ELECTROCUTANEOUS READY-SIGNAL VARIATION ON VISUAL REACTION-TIME.
Progress rept.,
Army Medical Research Lab Fort Knox Ky
Isaac Behar, and Joel S. Warm. 31 May 67, 13p
Rept no. USAMRL-731

Descriptors: (*Sensory perception, Reaction (Psychology)), Reflexes, Touch, Visual perception, Signals, Psychophysiology.

Two ready-signal variables (direction of change in electrocutaneous stimulation and method of presentation: 'trace' or 'delay') were combined in a 2 x 2 x Ss design. Neither variable produced a significant main effect but yielded a highly significant interaction. Results were interpreted in terms of arousal, inter-sensory, and conditioning explanations of ready-signal effects. (Author)
AD-652 887 HC$3.00 MF$0.65

PICTURE CODING.
Massachusetts Inst of Tech Cambridge Research Lab of Electronics
For primary bibliographic entry see Field 17B.
AD-652 906 Not available from CFSTI.

SINGLE FIBERS OF CAT OPTIC NERVE: 'THRESHOLDS TO LIGHT',
Massachusetts Inst of Tech Cambridge Research Lab of Electronics
For primary bibliographic entry see Field 6P.
AD-652 906 Not available from CFSTI.

BAYESIAN STATISTICAL INFERENCE FOR PSYCHOLOGICAL RESEARCH,
Michigan Univ Ann Arbor
Ward Edwards, Harold Lindman, and Leonard J. Savage. 15 Jan 62, 50p
AFOSR-2009
Contract AF 49(638)-769, Grant AF-AFOSR-62-182
Research supported in part by NONR.
Availability: Published in Psychological Review v70 n3 p193-242 May 1963.

Descriptors: (*Probability, *Psychometrics), Distribution theory, Psychology.

Bayesian statistics, a currently controversial viewpoint concerning statistical inference, is based on a definition of probability as a particular measure of the opinions of ideally consistent people. Statistical inference is modification of these opinions in the light of evidence, and Bayes' theorem specifies how such modifications should be made. The tools of Bayesian statistics include the theory of specific distributions and the principle of stable estimation, which specifies when actual prior opinions may be satisfactorily approximated by a uniform distribution. A common feature of many classical significance tests is that a sharp null hypothesis is compared with a diffuse alternative hypothesis. Often evidence which, for a Bayesian statistician, strikingly supports the null hypothesis leads to rejection of that hypothesis by standard classical procedures. The likelihood principle emphasized in Bayesian statistics implies, among other things, that the rules governing when data collection stops are irrelevant to data interpretation. It is entirely appropriate to collect data until a point has been proven or disproven, or until the data collector runs out of time, money, or patience. (Author)
AD-652 948 Not available from CFSTI.

THE MEASUREMENT OF SUPRATHRESHOLD PAIN,
Stanford Univ Calif Lab of Hypnosis Research
John Voevodsky, Leslie M. Cooper, Arlene H. Morgan, and Ernest R. Hilgard. 1967, 9p
AFOSR-67-1197
Contract AF 49 (638)-1436, Grant PHS-MH-3859
Availability: Published in The American Journal of Psychology v80 p124-8 Mar 1967.

Descriptors: (*Pain, Thresholds (Physiology)), Responses, Reaction (Psychology), Measurement, Statistical analysis.

The study of both subjective and physiological responses to painful stimulation is fraught with a number of difficulties, one of which is the difference in functional relationships between the threshold and suprathreshold of pain, such as surgical pain. Before undertaking studies of hypnotic analgesia we thought it desirable to calibrate the suprathreshold of pain in the normal waking state. This note refers to some preliminary results obtained in the course of the study when the S's hand and arm are immersed in ice water. (Author)
AD-652 985 Not available from CFSTI.

CLUSTER ANALYSIS AND THE SEARCH FOR STRUCTURE UNDERLYING INDIVIDUAL DIFFERENCES IN PSYCHOLOGIC PHENOMENA.
Technical rept.,
Illinois Univ Urbana Dept of Psychology
Ledyard R. Tucker. Feb 67, 55p
Contracts Nonr-1834 (39), N00014-66-C-0010A03
Prepared for presentation at the Conference on Cluster Analysis of Multivariate Data, 9-11 Dec 1966, in New Orleans, La.

Descriptors: (*Psychometrics, Factor analysis), Test construction (Psychology), Predictions, Reliability, Computer programs.

In the discussion of the relations of investigations of structure underlying individual differences in psychological phenomena to cluster analysis, emphasis was placed on the importance of clustering according to similarity of within-individual relations between variables such as the relation of values of a dependent variable to values to a manipulated independent variable. A method of analysis is described which is a generalization of the

Tucker-Messick method for investigation of individual differences in multidimensional scaling. This generalized procedure is applicable to a variety of types of relations between a dependent variable and given independent variables. The possible application of the results from studies using the method to clustering of individuals according to similarity of relation of the dependent variables to the independent variable is described. An appendix is included which contains a FASTRAN program to perform computations involved in the analysis for individual differences. (Author)
AD-652 999 HC$3.00 MF$0.65

THE NMRI DEEP ISOLATION LABORATORY.
Research rept.,
Naval Medical Research Inst Bethesda Md
Seward Smith, Thomas I. Myers, and Peter M. Edmondo. May 67, 25p
NAVMED-MF-022.01.03-1002-27

Descriptors: (*Confined environments, *Laboratories), Test facilities, Instrumentation, Life support, Confinement (Psychology), Safety, Monitors, Psychometrics, Data processing systems, Automation, Auditory signals.

The Naval Medical Research Institute deep-isolation laboratory is described and various aspects of its instrumentation are detailed. The lab consists of six highly-sound-reduced rooms and an adjacent control room. The rooms contain full life-support facilities for carrying out multiple-day studies of isolated confinement. Safety monitoring and psychological testing are conducted from the control room with no required physical contacts with test subjects. Automated testing and data recording are carried out, in some cases 24 hours a day, utilizing a versatile audio system and extensive programming and data recording equipment. This description emphasizes the furnishings and instrumentation installed for Project COMONOT, a study of 7-day isolation of individuals under different conditions of monotony and social contact. (Author)
AD-653 074 HC$3.00 MF$0.65

THE NONSYMMETRIC GAME: JOINT MAXIMUM, EFFICIENT SOLUTION AND MEASURES OF COLLUSION AND WELFARE,
Yale Univ New Haven Conn Cowles Foundation for Research in Economics
For primary bibliographic entry see Field 5C.
AD-653 087 HC$3.00 MF$0.65

ASSOCIATION IN A CLASS OF GROWTH,
Weather Squadron (3rd) Pope AFB N C Detachment 20
Rolf E. Bargmann. Dec 66, 55p
Contracts Nonr-1834 (39), N00014-66-C-0010-A03
Report on project Techniques for Investigation of Structure of Individual Differences in Psychological Phenomena. Prepared in cooperation with Georgia Univ.

Descriptors: (*Learning, Psychometrics), (*Psychometrics, *Statistical analysis), Iterative methods, Probability, Reliability, Factor analysis, Mathematical models, Sampling, Computer programs, Statistical processes.
Identifiers: Weibull process.

Birth models with time-dependent transition probabilities are useful for the analysis of growth functions. The 'availability' model (in contrast to the 'reliability' model) has been adopted, since initial time of observation or zero score is rarely a physically meaningful quantity in growth functionr. The Weibull class has been selected as a class of growth functions. The report contains description of methods for maximum-likelihood estimation of the Weibull parameter, and estimation of the weighted regression parameters. A measure of association is defined from the regression analysis, and called the index of biserial association. A package of computer programs for the 7094 has been prepared, and documented in the appendix. Results of the analysis of some sampling experiments have been reported for illustration. (Author)
AD-653 099 HC$3.00 MF$0.65

A FORTRAN II PROGRAM FOR THREE-MODE FACTOR ANALYSIS.
Technical rept.,
Illinois Univ Urbana Dept of Psychology
Robert L. Linn, Frank W. Snyder, Mark I. Appelbaum, and Ledyard R. Tucker. Mar 67, 41p
Contracts Nonr-1834 (39), N00014-66-C-0010-A03
Report on project 'Techniques for Investigation of Structure of Individual Differences in Psychological Phenomena.

Descriptors: (*Psychometrics, Factor analysis), (*Factor analysis, Computer programs), Programming languages.

A FORTRAN II program for Method III (large numbers of individuals in the sample) of three-mode factor analysis is presented. A description of the method of use of the program is given along with graphical representations of the data matrix and the sequencing of cards. A complefe listing of the FORTRAN II card deck is also given. (Author)
AD-653 100 HC$3.00 MF$0.65

THE LEARNING BEHAVIOR AND ERGODIC PROPERTY OF FINITE-STATE MARKOV CHAINS.
Technical rept. for 1 Jan 66-30 Jun 67,
Ohio State Univ Research Foundation Columbus
J. T. Tou, and H. H. Yeh. Jun 67, 38p Rept no. TR-2
Contract Nonr-495 (29)

Descriptors: (*Learning, *Behavior), (*Measure theory, Probability), Topology, Mapping (Transformations), Statistical analysis, Convergence, Theorems, Sequences, Set theory, Transformations (Mathematics).

The dynamic behavior of ergodic finite-state homogeneous Markov chains is studied. An ergodicity test of general natural is formulated. From this general test procedure, various test criteria are derived. One criterion is shown to be both necessary and sufficient. The ergodicity is found to be a topological property of the state flow graph of a finite-state homogeneous Markov chain or an equivalent stochastic automation. The dynamic behavior of an ergodic chain can be explained as a contraction mapping in the probability vector space. The norm of the induced transition probability matrix serves as pessimistic estimation of the learning rate.
AD-653 116 HC$3.00 MF$0.65

ELECTROCUTANEOUS PAIN THRESHOLDS IN HUMANS TO LOW FREQUENCY SQUARE-WAVE PULSES,
Hofstra Univ Hempstead N Y Dept of Psychology
Robert Plutchik, and Henry Bender. 31 Jan 66, 4p
Contract Nonr-2252 (01)
Prepared in cooperation with Matrix Corp., Arlington, Va.
Availability: Published in Journal of Psychology v62 p151-4 1966.

Descriptors: (*Pain, Thresholds (Physiology)), Touch, Psychophysiology, Electrophysiology, Skin, Pulse rate, Sex.

Twenty college students were used as subjects, 10 males and 10 females, ranging in age from 18 to 22 years. Silver disc EEG electrodes, one cm in diameter, were taped to the ventral pads of the first and fourth fingers of the right hand of each subject. No electrode paste was used. The subjects were then presented with rates of 1, 3, 6, 10, and 15 pulses per second in counterbalanced order, three times each, using a five-second period of stimulation and a 30-second interstimulus period. For each pulse rate, the intensity of the current was increased in discrete 0.1 ma increments in ascending order, using the method of limits. At the end of each five-second stimulus period, the subject reported whether or not the sensation was 'just noticeably unpleasant' or 'just noticeably painful.' The latter point was taken as the pain threshold. The data obtained from the males and the females were treated separately. (Author)
AD-653 118 Not available from CFSTI.

FREQUENCY ANALYSIS OF ELECTROENCEPHALOGRAPHIC RHYTHMS IN HUMANS EXPOSED TO HIGH INTENSITY INTERMITTENT AUDITORY INPUTS,
Hofstra Univ Hempstead N Y Dept of Psychology
Robert Plutchik. 31 Aug 66, 8p
Contract Nonr-2252 (01)
Availability: Published in Perceptual and Motor Skills v23 p955-62 1966.

Descriptors: (*Auditory perception, Electroencephalography),
Sensory perception, Auditory signals, Frequency analyzers, Inhibition, Visual perception.

Through binaural earphones, 10 Ss were presented with intermittent auditory stimuli ranging from 3 to 15 pps at intensities from 100 to 130 db. EEGs were taken and the occipital or temporal output was analyzed with a frequency analyzer. Only one of 10 Ss showed EEG following at most input frequencies. When the data from all Ss were combined, it was discovered that the introduction of auditory inputs at 10 pps produced an inhibition of the 10-cps alpha rhythm. The data imply a limited interaction between the visual and auditory modalities. (Author)
AD-653 119 Not available from CFSTI.

MULTIPLE RATING SCALES FOR THE MEASUREMENT OF AFFECTIVE STATES,
Hofstra Univ Hempstead N Y Dept of Psychology
Robert Plutchik. 1966, 3p
Contract Nonr-2252 (01)
Availability: Published in Journal of Clinical Psychology v22 n4 p423-5 Oct 1966.

Descriptors: (*Emotions, Psychometrics), Test construction (Psychology), Stress (Psychology), Anxiety.

At several different class meetings, 40 college students completed an affect rating scale, sampling eight different emotions. The emotions sampled were based upon a recently formulated theory. The first three meetings were control days. During the fourth meeting, the students took a scheduled examination and the graded papers were returned during a fifth meeting. The results of the study showed that on the control days, seven of the eight scales showed no significant changes. On the test day, four of the eight affects showed significant changes relative to the control levels. On the test-return day, seven of the eight emotions showed highly significant changes in mean ratings relative to control levels. These findings suggest that the affect scales used are highly sensitive to stresses, cover a wide range of affect states, and have theoretical relevance. (Author)
AD-653 120 Not available from CFSTI.

STIMULUS-ORIENTED APPROACH TO DETECTION RE-EXAMINED,
Texas Univ Austin Defense Research Lab
For primary bibliographic entry see Field 20A.
AD-653 123 Not available from CFSTI.

STUDIES IN RESEARCH METHODOLOGY. VII. THE CENTRAL LIMIT EFFECT FOR TWO DOZEN POPULATIONS AND ITS CORRELATION WITH POPULATION MOMENTS.
Aerospace Medical Research Labs Wright-Patterson AFB Ohio
For primary bibliographic entry see Field 12A.
AD-653 189 HC$3.00 MF$0.65

VALIDATION OF THE DEI TECHNIQUE FOR LARGE-SCALE DISPLAY EVALUATION.
Final rept., Feb 66-Mar 67,
Applied Psychological Services Wayne Pa
Arthur I. Siegel, anu Philip J. Federman. May 67, 108p
RADC-TR-67-134
Contract AF 30 (602)-4056

Descriptors: (*Display systems, *Man-machine systems), (*Decision making, *Psychometrics), Predictions, Applied psychology, Colors, Coding, Programming (Computers), Tables, Performance (Human), Pictures, Statistical analysis, Effectiveness, Analysis of variance.

The validity of the display evaluative index technique was investigated in two separate studies. Both studies indicated adequate predictive validity for the technique. The ability of the technique to predict 'decision making' was found to be superior to its ability to predict 'information extraction' processes. Generally, it was found that pictorial type displays are superior to tabular displays for 'decision making;' no difference seemed manifest between the two display types for 'information extraction.' Adding appropriate color coding seemed to augment the ability of the user to employ display information. As fact density increased, display decision making scores decreased.
AD-653 209 HC$3.00 MF$0.65

DESIGN PRINCIPLES FOR LEARNING SYSTEMS,
Battelle Memorial Inst Columbus Ohio
For primary bibliographic entry see Field 9B.
AD-653 258 Not available from CFSTI.

THE INFLUENCE OF SENTENCE STRUCTURE ON THE READING PROGRESS.
Hebrew Univ Jerusalem (Israel)
For primary bibliographic entry see Field 5G.
AD-653 263 HC$3.00 MF$0.65

HUMAN INFORMATION TRANSMISSION WITH DIFFERENT ENCODING PROCEDURES FOR BINARY STIMULI,
General Dynamics Corp Groton Conn Electric Boat Div
Jerry C. Lamb, and Herbert Kaufman. 18 Nov 66, 30p Rept no. U417-66-035
Contract Nonr-2512 (00)
Prepared in cooperation with Connecticut Univ., Storrs. Rept. on Proj. SUBIC.

Descriptors: (*Coding, *Learning), (*Symbols, Memory), Information theory, Data processing systems, Reaction (Psychology), Numbers, English language, Verbal behavior.
Identifiers: SUBIC.

Twelve subjects took part in an experiment involving a continuous information transmission task. Three different code types and two levels of stimulus redundancy were used; the stimuli were binary digits and the subject's task was to code the stimuli into verbal equivalents of letters of the English alphabet. The results indicate that transmission rate is unaffected over the range of variables used in the study, i.e., subjects transmit information at a constanf rate under a variety of experimental conditions. (Author)
AD-653 277 HC$3.00 MF$0.65

EXPERIMENTAL INVESTIGATIONS OF MAN-MACHINE PROCESSING OF INFORMATION, VOLUME I.
General Dynamics Corp Groton Conn Electric Boat Div
For primary bibliographic entry see Field 17A.
AD-653 278 HC$3.00 MF$0.65

PROCEDURAL DETAILS FOR PROJECT COMONOT.
Research rept.,
Naval Medical Research Inst Bethesda Md
Seward Smith, Thomas I. Myers, Eugene Johnson, Steven L. Milstein, and J. Michael Walsh. Jun 67, 64p
NAVMED-MF022.0103-1002-28

Descriptors: (*Sensory deprivation, Experimental design), (*Confinement (Psychology), Reaction (Psychology)), Adjustment (Psychology), Stress (Psychology), Psychometrics, Personality tests, Confined environments.

A detailed summary is given of the research procedure employed during the first phase of Project COMONOT. COMONOT (comparative monotony) is an experimental assessment of various conditions of boredom and monotony, at one extreme requiring a 7-day stay in a totally dark, soundproof cubicle. Attention in this paper is focused on: (1) the rationale of the study; (2) definition of the three experimental conditions; (3) a description of the subject population; (4) details of the test program; and (5) how factors affecting experimental 'set' were dealt with. Also included are the actual briefing scripts and test schedules followed. The paper is intended to provide the sorts of additional procedural details that, due to space limitations, usually must be omitted from journal articles. (Author)
AD-653 290 HC$3.00 MF$0.65

PERFORMANCE GOALS AS DETERMINANTS OF LEVEL OF PERFORMANCE AND BOREDOM,
American Institutes for Research Silver Spring Md
Edwin A. Locke, and Judith F. Bryan. 6 Apr 66, 11p
Contract Nonr-4792 (00)
Availability: Published in Journal of Applied Psychology v51 n2 p120-30 1967.

Descriptors: (*Performance (Human), *Motivation), Perception (Psychology), Psychomotor tests, Performance tests, Behavior, Experimental design, Applied psychology, Statistical analysis.

Six experiments (2 pilot studies and 4 main experiments) are reported dealing with the relationship of performance goals to level of performance and degree of boredom or interest in the task. Tasks used included simple addition, perceptual speed, and psychomotor coordination. Trial times ranged from 2 min. to 2 hr. In the 2 pilot studies postexperimental goal descriptions were significantly related to performance level, and Ss indicated that trying for a specific goal or score was the major source of task interest. In the 4 main experiments a specific hard goal led to a higher level of performance and more task interest than a goal of 'do your best.' There was no consistent relationship between changes in boredom or interest and changes in performance within the experimental groups. (Author)
AD-653 328 Not available from CFSTI.

COMPENSATION FOR AUDITORY RE-ARRANGEMENT IN THE ABSENCE OF OBSERVER MOVEMENT,
Tufts Univ Medford Mass
Ronald Kalil, and Sanford J. Freedman. 1 Mar 67, 6p
AFOSR-67-1234
Contract AF 49 (638)-1282, Grant PHS-RD-1890-P
Availability: Published in Perceptual and Motor Skills v24 n2 p475-8 Apr 1967.

Descriptors: (*Auditory perception, Reaction (Psychology)), Psychomotor tests, Auditory signals, Sources, Visual signals, Stimulation, Sensory perception.

Ss wearing a pseudophone which produced functional rotation of the interaural axis sat motionless watching a sound-source move in an arc in front of their bodies. After short exposures, significant adaptive compensation for this auditory re-arrangement was measured. An interpretation is suggested in terms of the resolution of intersensory discordance. (Author)
AD-653 358 Not available from CFSTI.

SPEECH RESEARCH.
Haskins Labs New York
For primary bibliographic entry see Field 17B.
AD-653 373 HC$3.00 MF$0.65

ANALYTIC STUDIES IN THE LEARNING AND MEMORY OF SKILLED PERFORMANCE SEMI-ANNUAL REPORT, OCT. 1, 1966 - MAR. 31, 1967.
Kansas State Univ., Manhattan. Dept. of Psychology.
M. E. Noble, and D. A. Trumbo. 24 Apr 67, 18p
NASA-CR-84473
Grant NSG-606

Descriptors: *Human performance, *Learning, *Memory, Decision, Dual, Human, Interference, Performance, Psychology, Response, Skill, Task.

For abstract, see STAR 05 14.
N67-27507 HC$3.00 MF$0.65

THE ELECTRORETINOGRAPHIC RESPONSE TO WEAK STIMULI OF LARGE SUBTENSE II.
Institute for Perception RVO-TNO, Soesterberg (Netherlands).
For primary bibliographic entry see Field 6P.
For abstract, see STAR 05 14.
N67-27698 HC$3.00 MF$0.65

INFORMATION PROCESSING IN THE FUNCTIONAL VISUAL FIELD.
Informatieverwerking in Het Funktioneel Gezichtsveld
Institute for Perception SVO-TNO, Soesterberg (Netherlands).
A. F. Sanders. 1967. 16p IZF-1967-6, TDCK-47866
in Dutch, English Summary

Descriptors: *Eye movement, *Information processing, *Visual perception, Coding, Eye, Field, Functional, Group, Information, Movement, Perception, Performance, Processing, Psychology, Relation, Response, Task, Visual.

For abstract, see STAR 05 14.
N67-27773 HC$3.00 MF$0.65

DECISION MAKING AND LEADER SELECTION.
Final technical rept.,
System Development Corp., Santa Monica, Calif.
A. Binder, and S. J. Terebinski. 24 Jun 66, 27p
TM-3030/000/00
Grant NSF-GS-507

Descriptors: (*Leadership, Selection), (*Decision making, Leadership), Group dynamics, Behavior, Mathematical models, Reaction (Psychology), Reasoning.

The primary emphasis was upon the application and development of mathematical models to small-

group behavior. Experiments were conducted in which members of three-person groups voted for one of their members as leader on each of n trials. On a trial the leader made a decision as to which of two events would occur and the members were informed of his success or failure before the next voting cycle. Predictions from a Markov model were compared with the behavior of the subjects in the experiment. These comparisons showed a close fit in regard to some aspects of the groups' behavior, but also indicated the kinds of modifications required in the model in order to describe the data more adequately. A modified model has been developed which is still Markovian, but which contains more parameters than previously as well as allowance for changes in discriminations over trials. The revised model has not yet been tested.
PB-173 592 HC$3.00 MF$0.65

SCIENTIFIC INFORMATION EXCHANGE AT AN INTERDISCRIPLINARY BEHAVIORAL SCIENCE CONVENTION,
Stanford Univ., Calif. Inst. for Communication Research.
William J. Paisley, and Edwin B. Parker. Mar 67, 86p
Grant NSF-GN-434

Descriptors: (*Symposia, *Social communication), Behavior, Scientific research, Information retrieval, Dissemination, Social sciences, Periodicals, Public opinion.
Identifiers: Scientific information exchange.

Content: Other studies of scientific conventions; A note on the American Association for Public Opinion Research; A study of the 1966 AAPOR Convention: Method; Characteristics of attendants; Some information-processing activities external to the convention; Information gathering at the convention; Multivariate analyses of convention information gathering; Multivariate analyses of the information input and output indices; Miscellaneous topics: (1) Contact with facility conducting most important research; (2) Some comparisons of APA and AAPOR findings; (3) Aggregate response patterns; Possible next steps toward an understanding of information exchange at scientific meetings.
PB-174 837 HC$3.00 MF$0.65

5K. SOCIOLOGY

EXAMPLES OF CROSS-CULTURAL PROBLEMS ENCOUNTERED BY AMERICANS WORKING OVERSEAS: AN INSTRUCTOR'S HANDBOOK,
George Washington Univ., Alexandria, Va. Human Resources Research Office.
Robert J. Foster. May 65, 113p

Descriptors: (*Culture, Instruction manuals), Training, Social sciences, Behavior, Personality, Civilian personnel, Attitudes, Social communication, Group dynamics, Handbooks, Instructors.

The handbook is a collection of summary accounts of events that illustrate some of the problems frequently encountered by Americans working overseas, particularly those providing technical assistance in developing countries. It is intended primarily as a source book for instructors in area training programs who are searching for appropriate true-life examples that will give their classroom presentation more impact and meaning. The illustrations were taken from published and unpublished sources. (Author)
AD-465 043 HC$3.00 MF$0.65

TUNISIA: SPORTS AND EDUCATION,
American Univ Washington D C Center for Research in Social Systems
James M. Dodson, John M. Lord, Carl F. Rosenthal, Barbara A. Wilson, and Mildred M. Yenchius. May 67, 31p Rept no. CRESS-CINFAC-R-0353
Contract DA-49-092-ARO-7

Descriptors: (*Government (Foreign), *Tunisia), (*Recreation, *Education), Attitudes, Instructors, Training, Political science, Population, Mobilization, Urban areas, Culture.

The report describes Tunisian government sports policies; attitudes toward and popularity of sports; sports clubs and facilities; a summary of recent sports activities; physical education and games in the school curriculum; and teacher training for physical education.
AD-652 731 HC$3.00 MF$0.65

THE FUTURE OF SCIENCE,
Rand Corp Santa Monica Calif
Olaf Helmer. May 67, 17p Rept no. P-3607
Submitted for publication in Science Journal Oct 1967.

Descriptors: (*Social sciences, Predictions), (*Scientific research, Predictions), Sociology, Attitudes, Computers, Public opinion, Scientific personnel, Organizations.
Identifiers: Delphi technique.

The future of science is discussed in terms of (1) the size of the scientific establishment; (2) attitudes toward the future; (3) changes in research methods; (4) new forms of procedures: conferences; research-computer symbiosis; interdisciplinary teams; university reform; publications; and the popularization of science; (5) future developments and breakthroughs.
AD-653 176 HC$3.00 MF$0.65

6. BIOLOGICAL AND MEDICAL SCIENCES

A SYSTEM FOR BIOMEDICAL DATA MANAGEMENT (DATASYS),
Oak Ridge National Lab., Tenn.
H. Katzan, Jr. Jan 67, 11p
Contract W-7405-eng-26

Descriptors: (*Computer programs, Biology), (*Medicine, *Programming (Computers)), Programmers, Computers, Personnel, Scientific personnel.

For abstract, see NSA 21 12.
ORNL-4064 HC$3.00 MF$0.65

6A. BIOCHEMISTRY

MODIFICATION BY HEXITOLS AND SUGARS OF CHANGES INDUCED IN YEAST BY STARVATION. II. CELLULAR DEPLETIONS AND SUGAR BINDING.
Final rept.,
Army Medical Research Lab Fort Knox Ky
Edward Spoerl, and R. J. Doyle. 8 May 67, 54p
USAMRL-727

Descriptors: (*Yeasts, Starvation), (*Carbohydrates, Metabolism), Cells (Biology), Transport properties, Radiation effects, Carbon dioxide, Adenosine phosphates, Glucose, Enzymes, Chromatographic analysis, Nucleotides.

Losses of 260 millimicrons absorbing material from yeast cells during incubation in solutions of hexitols or sugars were not correlated with the capacity of incubated cells to produce CO_2 from glucose. Depending upon the compound used, resulting rates of CO_2 output were greater as well as less than that of cells incubated in water. NAD content was not related, but ATP contents below average occurred in cells showing a lag period and low rates of output; thiamine pyrophosphate and decarboxylase activity levels reduced output in some cases. Glucose, sorbose and mannitol uptake was immediate and was high in cells with high rates of CO_2 output, and calculated internal concentrations of sorbose and mannitol exceeded medium concentrations in these cases. Both cell size and intracellular sugar space were similar in incubated cells, except for the small cells resulting from incubation in 0.1M glucose. Measurements of sorbose and mannitol exit showed that binding of these compounds occurred. Binding resistant to extraction by boiling water was not as extensive as that shown by exit measurements. Chromatograms of cell extracts showed that sorbose and mannitol were not converted to other compounds, and chemical assays confirmed that uptake was greater by cells incubated in hexitols and certain sugars. Thus, high sugar uptake depended upon binding, and was correlated with high rates of CO_2 output; the data indicate that compartmentation of cell intermediates also was involved in regulating CO_2 output. (Author)
AD-652 704 HC$3.00 MF$0.65

DILATOMETRIC STUDY OF THE INTERACTIONS OF BOVINE SERUM ALBUMIN WITH UREA,
Naval Medical Research Inst Bethesda Md
Sam Katz, and T. G. Ferris. 29 Apr 66, 10p
NAVMED-MR005.20.0021-5
Prepared for presentation in part by the Annual Meeting of the Biophysical Society (10th), Boston, Mass, Feb 1966. Prepared in cooperation with West Virginia Univ., Morgantown. Medical Center.
Availability: Published in Biochemistry v5 p3246-53 1966.

Descriptors: (*Serum albumin, Molecular association), Urea, Inhibition, Reaction kinetics, Thermodynamics, Electrophoresis.
Identifiers: Denaturation.

The dilatometric study of the interaction of bovine serum albumin with urea relates the resultant volume changes to the conformational changes produced by the denaturation process. The volume changes were determined with a modified Teflon-sheathed Linderstrom-Lang-Lanz type dilatometer. The experimental precision of $\leq$ or = 0.03 microliters necessitated temperature control within plus or minus 0.001C. The following parameters were investigated: hydration state and protein and urea concentrations. The observed volume changes were converted by appropriate thermodynamic arguments to (v23 - v2), the difference between the partial molar volume of the protein in the denaturant and that in water. Albumin denatured in 4.0 M urea gave a positive value for (v23 - v2); however, with increased urea concentration this quantity decreased to negative values at urea concentration $>$ or = 7 M. Kinetic and thermodynamic data support the hypothesis that this process involves a series of sequential and/or parallel reactions to produce several species of denatured albumins as a function of urea concentration. Parallel experiments performed with quantitative planar acrylamide electrophoresis support this thesis. (Author)
AD-652 940 Not available from CFSTI.

INFORMAL SYMPOSIUM, REVERSIBLE PHOTOCHEMICAL PROCESSES,
Dayton Univ Ohio
For primary bibliographic entry see Field 7E.
AD-653 030 HC$3.00 MF$0.65

HEMOGLOBIN ALPHA 2 BETA 2 121 Lys CHEMICAL IDENTIFICATION IN AN EGYPTIAN FAMILY,
Naval Medical Research Inst Bethesda Md
A. Karim Kamel, Kirk C. Hoerman, and Ahmad Y. Awny. 13 Feb 67, 4p

NAVMED-MR005.19.6003-7
Prepared in cooperation with Ain-Shams University Medical School, Cairo. Research supported in part by ARPA, Order-580.
Availability: Published in Science v156 n3773 p397-8 Apr 21 1967.

Descriptors: (*Hemoglobin, Electrophoresis), Blood diseases, Amino acids, Peptides, Anomalies, Genetics, Egypt.

Study of the amino acid composition and amino-terminal residue in the abnormal peptide of an electrophoretically slow hemoglobin revealed that the globin's structure was alpha 2 beta 2 121 Lys (O beta). This hemoglobin had been provisionally classified as Hb E or as a new hemoglobin. The clinical significance of this abnormality is not yet defined. (Author)
AD-653 036 Not available from CFSTI.

RELATIONSHIP BETWEEN FUNCTION AND METABOLIC ACTIVITY OF HEART IN SITES.
Albert Einstein Medical Center Philadelphia Pa
For primary bibliographic entry see Field 6P.
AD-653 221 HC$3.00 MF$0.65

EFFECTS OF CORTISOL RELEASED CUTANEOUS PROTEASE UPON THE PERMEABILITY OF THE MICRO-CIRCULATION,
Children's Hospital Washington D C Biochemical Research Lab
A. W. J. Lykke, D. A. Willoughby, and J. C. Houck. 1 Jun 66, 9p
Contract Nonr-4402 (00), Grant PHS-AM-8168
Prepared in cooperation with Saint Bartholomew's Hospital, London (England). Dept. of Pathology.
Availability: Published in Journal of Investigative Dermatology v48 n4 p318-25 1967.

Descriptors: (*Peptide hydrolases, *Vasoactive agents), (*Blood vessels, Permeability), Corticosteroid agents, Skin, Injection (Medicine), Leukocytes, Capillaries, Pharmacology, Histology, Tissue extracts, Rats.

Extracts from the skin of rats treated with cortisol have been found to contain a protease. Extracts of the skin of normal untreated rats do not contain this protease. Injections of low concentrations of the cortisol-released protease preparation (CRPP) gave increased vascular permeability and emigration of leukocytes. It has been found that the action on vascular permeability is different from that invoked by many of the known permeability factors. The significance of this factor is discussed. (Author)
AD-653 230 Not available from CFSTI.

THE INTERACTION OF ESCHERICHIA COLI RIBSOMES WITH p-CHLOROMERCURIBENZOATE,
National Research Council of Canada Ottawa (Ontario) Div of Biosciences
Jerry Hsueh-Ching Wang, and A. T. Matheson. 24 Oct 66, 12p
NRC-9475
Availability: Published in Biochimica et Biophysica Acta v138 p296-306 1967.

Descriptors: (*Ribosomes, Decomposition), Dissociation, Escherichia coli, Oxidation, Thiols, Molecular association, Sedimentation, Absorption spectrum, Molecular weight, Peptide hydrolases, Antimetabolites, Chlorine compounds, Mercury compounds, Benzoates, Metalorganic compounds.

When ribosomes from early log-phase cultures of Escherichia coli were incubated with 0.5 mM p-chloromercuribenzoate (PCMB) (in 10 mM Tris buffer (pH 7.6) containing 10 mM Mg (2+ , the 100-S dimers were completely dissociated into 70-S monomers. The dissociation was not reversed by increased concentrations of Mg (2+) and/or spermine. It was reversed, however, by 2-mercaptoethanol. Mild 12 oxidation also resulted in 100-S dissociation. Other sulfhydryl reagents, N-ethylmaleimide, 5,5'-dithio-bis- (2-nitrobenzoic acid) and iodacetate, showed no effect. Approximately 10 moles of PCMB were bound per ribosome prior to the onset of dissociation of the 100-S particles. When 20-25 PCMB molecules were bound per ribosome dissociation was almost complete. Dissociation of 100-S ribosomes stems from the reaction of PCMB with sulfhydryl groups presumably in the ribosomal protein. Incubation of untreated ribosomes with 2-mercaptoethanol resulted in an association of 70-S particles into the 100-S dimer, ruggesting the relative concentration of the 100- and 70-S particles in vivo may be governed by sulfhydryl interactions. (Author)
AD-653 387 Not available from CFSTI.

ENERGY CONVERSION BY THE PHOTOSYNTHETIC APPARATUS.
Brookhaven National Lab., Upton, N. Y.
Jan 67, 522p
Conf-660651
Contract AT (30-2)-GEN-16
Rept. of Brookhaven Symposium in Biology (19th), Upton, N. Y., Jun 6-9, 1966.

Descriptors: (*Energy conversion, *Photosynthesis), Symposia, Biology, Ecology, Scientific personnel.

For abstract, see NSA 21 12.
BNL-989 HC$3.00 MF$0.65

PURIFICATION AND PROPERTIES OF RIBONUCLEIC ACID POLYMERASE FROM ESCHERICHIA COLI,
Los Alamos Scientific Lab., N. Mex.
For primary bibliographic entry see Field 6M.
For abstract, see NSA 21 12.
LA-3638 HC$3.00 MF$0.65

KINETIC STUDIES ON HEMOGLOBIN BY FLASH PHOTOLYSIS FINAL SCIENTIFIC REPORT, 1 DEC. 1965 - 31 JAN. 1967.
Rome Univ. (Italy). Instituto Di Chimica Biologica.
E. Antonini. 31 Jan 67, 7p AFOSR-67-0521, AD-648666
Contract AF-EOAR-66-22

Descriptors: *Hemoglobin, *Human body, *Photolysis, Analysis, Blood, Body, Carbon, Chain, Dissociation, Flash, Human, Kinetics, Monoxide, Protein, Quantity, Reaction.

For abstract, see STAR 05 14.
N67-26485 HC$3.00 MF$0.65

POSSIBLE EXTENSIONS AND APPLICATIONS OF THE COLLECTIVE MODEL OF THE HYDROGEN BOND.
Possibili Estensioni E Applicazioni Del Modello "collettivo" Del Legame A Idrogeno
Istituto Superiore Di Sanita, Rome (Italy). Laboratori Di Fisica.
M. Ageno. 7 Dec 66, 24p ISS-66/47
in Italian, English Summary

Descriptors: *Hydrogen bond, *Protein, Atom, Bond, Bridge, Energy, Extension, Hydrogen, Interaction, Model, Molecule, Physics, Proton, Ring, State, Tetrahedron, Theoretical.

For abstract, see STAR 05 14.
N67-27135 HC$3.00 MF$0.65

STUDIES OF RADIOACTIVITY AND HYDROTHERMAL PROCESSES IN PROTOBIOCHEMISTRY ON EARTH AND THE MOON.
Nuclear Science and Engineering Corp., Pittsburgh, Pa.
R. L. Bogner, S. L. Hood, S. M. Somani, E. R. White, and V. R. Zink. Mar 67, 53p NASA-CR-84414, NSEC-131
Contract NASW-1508

Descriptors: *Abiogenesis, *Ionizing radiation, *Protobiology, *Synthesis, Acid, Amino, Chemical, Compound, Earth, Ionizing, Mars, Model, Moon, Organic, Radiation, Sulfur, System.

For abstract, see STAR 05 14.
N67-27373 HC$3.00 MF$0.65

AMINO ACIDS AND AMINO SUGARS IN CALCIFIED TISSUES OF PORTUNID CRABS.
Woods Hole Oceanographic Institution, Mass.
F. G. Carey, E. T. Degens, and D. W. Spencer. 1967, 14p NASA-CR-84429
Contracts NSR-22-014-001, NSF G-816

Descriptors: *Amino acid, *Animal study, *Calcium metabolism, *Galactose, *Tissue, Acid, Amino, Animal, Calcification, Calcium, Crab, Exoskeleton, Magnesium, Metabolism, Mineral, Strontium, Study.

For abstract, see STAR 05 14.
N67-27707 HC$3.00 MF$0.65

SIGNIFICANCE OF ELECTROSTATIC INTERACTIONS IN DETERMINING PROTEIN CONFORMATION,
California Univ., Livermore. Lawrence Radiation Lab.
Russell F. Bjorklund. 9 Dec 66, 18p
Contract W-7405-eng-48

Descriptors: (*Proteins, X-ray diffraction analysis), (*Biochemistry, Electrostatics), Amino acids, Interactions, Molecular structure, Peptides, Muramidase.

For abstract, see NSA 21 12.
UCRL-50160 HC$3.00 MF$0.65

6B. BIOENGINEERING

PROBLEMS OF BIOTELEMETRY DURING PROLONGED SPACE FLIGHTS.
National Aeronautics and Space Administration, Washington, D. C.
For primary bibliographic entry see Field 9F.
For abstract, see STAR 05 14.
N67-26625 HC$3.00 MF$0.65

SOVIET APPLICATION OF CYBERNETICS IN MEDICINE: ARTIFICIAL LIMBS.
For primary bibliographic entry see Field 6E.
PB-174 827 HC$3.00 MF$0.65

6C. BIOLOGY

PHYSIOLOGICAL TOLERANCE STUDY OF CHIMPANZEES BREATHING 100 PERCENT OXYGEN AT 5 p.s.i.
Aeromedical Research Lab. (6571st), Holloman AFB, N. Mex.
For primary bibliographic entry see Field 6P.
AD-471 457 HC$3.00 MF$0.65

DNA SYNTHESIS IN RELATION TO CELL DIVISION IN TETRAHYMENA PYRIFORMIS,
Naval Radiological Defense Lab., San Francisco, Calif.
I. L. Cameron, and D. S. Nachtwey. 12 Oct 66, 33p USNRDL-TR-1084
NAVMED-MR005.08-0012

Descriptors: (*Desoxyribonucleic acids, Biosynthesis), (*Cell division, *Ciliata), Nutrition, Autoradiography, Temperature, Labeled substances.
Identifiers: Tetrahymena.

The effect of different nutritional conditions on the durations of the G1, S, G2 and D periods of exponentially replicating Tetrahymena pyriformis strain HSM was determined with autoradiographic techniques and observation of individual cells. The data indicate that, with decreased availability of nutrients, DNA synthesis is initiated proportionately later in the cell division cycle and that the proportion of the cell cycle spent in DNA synthesis increases. The effect of temperature on the relationship of the phases of the cell cycle was examined. Between 29 and 20C, the generation time and the time spent in the G2 period about double while the time spent in the S phase remains abolut the same. This phenomenon results in a reduction in the proportion of the generation time spent in the S phase and a compensatory increase in the G1 phase proportion. These results are discussed as they relate to nutritional factors involved in initiation and maintenance of DNA synthesis. (Author)
AD-642 777 HC$3.00 MF$0.65

RUNNING PERFORMANCE OF THE MONGOLIAN GERBIL, MERIONES UNGUICULATUS.
Part 3 of Final rept.,
Delaware Univ Newark
Charles G. Wilber, and Carole Meehan. May 67, 8p Rept no. 2-97-193-T3
Contract DA-49-193-MD-2627

Descriptors: (*Rodents, Behavior), Temperature, Diurnal variations, Motion, Antimnlarials.

Gerbils (Meriones unguiculatus) were put into activity cages under different conditions. They ran more during the hours 2000 to 2400 than at any time during the day. They ran more at 30C than at 20C or 10C. Variation was rather large. (Author)
AD-652 734 HC$3.00 MF$0.65

MYSID STATOLITHS IN SHELF SEDIMENTS OFF NORTHWEST NORTH AMERICA,
Northwestern Univ Evanston Ill Dept of Geology
For primary bibliographic entry see Field 8G.
AD-652 746 Not available from CFSTI.

RADIATION-INDUCED LEUKEMIA IN GERMFREE RODENTS,
Notre Dame Univ Ind Lobund Lab
Morris Pollard, and Masahiro Kajima. 1966, 5p
Grant PHS-PH-43-65-1018
Availability: Published in The Proc. Intern. Conf. Radiation Biology and Cancer p175-9 1966.

Descriptors: (*Germ-free animals, *Leukemia), (*Radiation effects, Germ-free animals), Etiology, Viruses, Whole body irradiation, Electron microscopy, Virus diseases, Cancer, Neoplasms, Rodents, Radioprotective agents, Toxins + antitoxins, X rays.

Representative numbers of germfree mice were exposed to whole-body X-irradiation similar to the regime recommended by Kaplan and Brown (1952), and they were maintained germfree for the duration of the experiment. Significant numbers of mice among all of the strains developed lesions of lymphatic leukemia: thymomas, enlarged lymph nodes and spleens, and swollen visceral organs (Pollard and Matsuzawa, 1964). Microscopical examinations revealed extensive infiltrations of the organs with lymphoblasts. Examinations of ultrathin sections of the lymphatic organs revealed virus-like types A and C particles in and around the lymphoid cells (Kajima and Pollard, 1965 b). Cell-free extracts of thymoma cells from some of the radiation-induced leukemic mice were inoculated intrathymicnlly into newborn C3H mice and they developed leukemia within the following 3 to 6 months. Thus leukemia-like particles were demonstrated in germfree mice by electron microscopic examinations, leukemia was induced in them by X-rays, and viral etiology was demonstrated by animal inoculations. On the basis of the survey for virus particles in mouse strains, it is likely that all mice have congenitally-propagated leukemogenic virus. The disease in germfree mice was indistinguishable from that observed in conventional counterpart animals. (Author)
AD-652 785 Not available from CFSTI.

RADIATION PATHOLOGY IN GERMFREE MICE AND BONE MARROW TRANSPLANTATION IN IRRADIATED GERMFREE MICE,
Notre Dame Univ Ind Lobund Lab
For primary bibliographic entry see Field 6R.
AD-652 787 Not available from CFSTI.

ORIGIN OF ELECTRICAL RESPONSES IN THE EYE OF PERIPLANETA AMERICANA,

Naval Medical Research Inst Bethesda Md
M. L. Wolbarsht, H. G. Wagner, and D. Bodenstein. 1966, 14p
NAVMED-MR005.13-1500-05
Research supported in part by Grant NSF-G-21759. Prepared in cooperation with Virginia Univ., Charlottesville. Dept. of Biology.
Availability: Published in Proceedings of the International Symposium on the Functional Organization of the Compound Eye p207-17 Oct 25-7 1965.

Descriptors: (*Blattidae, Electroretinography), (*Insects, Eye), Arthropods, Cornea, Retina, Electrophysiology, Illum ination, Responses.

The compound eyes of many insect species respond to illumination with a potential consisting of several phases. In the electroretinogram (ERG) of the cockroach (Periplaneta americana) compound eye, there is an initial fast cornea negative phase followed by a maintained negativity during the illumination and then following extinction of illumination there is a further enhancement of the negativity or an 'off' response. This is followed by a return to the resting level. Adult cockroach eyes which have been transplanted to the leg lack connections with the central nervous system. These eyes show only a maintained cornea negative response during illumination and lack both the fast 'on' and 'off' components of the response of the normal compound eye. The response of the normal compound eye is changed reversibly into that of the transplanted eye if the animal is anesthetized with CO2. (Author)
AD-652 789 Not available from CFSTI.

AN ECOLOGICAL STUDY ON THE EFFECTS OF CERTAIN CONCENTRATIONS OF CACODYLIC ACID ON SELECTED FAUNA AND FLORA.
Vitro Corp of America Eglin AFB Fla Vitro Services Div
For primary bibliographic entry see Field 6F.
AD-652 852 HC$3.00 MF$0.65

A SURVEY OF SOME DICOTYLEDONOUS PLANTS; BIOASSAY AND CHEMICAL ANALYSIS.
Technical rept.,
Edgewood Arsenal Md
Elmer G. Worthley, and C. Donald Schott. May 67, 18p Rept no. EATR-4088

Descriptors: (*Plant tissue, *Pharmacology), Toxicity, Biological assay, Chemical analysis, Tissue extracts, Alkaloids, Glycosides, Anthoxanthin pigments, Plants (Botany).
Identifiers: Tannins.

In this study, aqueous and 95% ethanol extracts of both temperate and tropical flora were administered to mice to determine any possible pharmacological action and were analyzed chemically for the presence or absence of alkaloids, saponins, tannins, and flavonoids. Twenty-five species of plants, representing 17 families and 25 genera, were used. Pharmacological activity, mostly depressant, was recorded for 14 of the 25 plants. Tannins were present in 18 species, saponins in 17 species, flavonoids in 15 species, and alkaloids in 7 species. (Author)
AD-652 880 HC$3.00 MF$0.65

INFLUENCE OF THE AMAZON RIVER OUTFLOW ON THE ECOLOGY OF THE WESTERN TROPICAL ATLANTIC. I. HYDROGRAPHY AND NUTRIENT CHEMISTRY.
Woods Hole Oceanographic Institution Mass
For primary bibliographic entry see Field 8A.
AD-652 888 Not available from CFSTI.

SODIUM, CALCIUM, AND MAGNESIUM IN TISSUES OF THE GERBIL, MERIONES UNGUICULATUS EXERCISED TO EXHAUSTION.
Part 4 of Terminal rept.,
Delaware Univ Newark
Charles G. Wilber. Jun 67, 5p Rept no. 2-97-193-T4
Contract DA-49-193-MD-2667
See also AD-651 505, AD-651 753 and AD-652 734.

Descriptors: (*Rodents, Exercise), (*Fatigue (Physiology), Biochemistry), Sodium, Calcium, Magnesium, Tissues (Biology), Ions.

Calcium is decreased in the heart and kidneys of exercise-exhausted gerbils. Magnesium is decreased in liver, kidney, heart and lungs but increased in muscle of these animals. Sodium is markedly decreased in the kidneys of the exhausted gerbils. (Author)
AD-652 890 HC$3.00 MF$0.65

INFLUENCE OF THE AMAZON RIVER OUTFLOW ON THE ECOLOGY OF THE WESTERN TROPICAL ATLANTIC. II. ZOOPLANKTON ABUNDANCE, COPEPOD DISTRIBUTION, WITH REMARKS ON THE FAUNA OF LOW-SALINITY AREAS.
Woods Hole Oceanographic Institution Mass
For primary bibliographic entry see Field 8J.
AD-653 033 Not available from CFSTI.

LIST OF MARINE ALGAE OF SOUTHERN SAKHALIN AND THE SOUTHERN KURILE ISLANDS,
Naval Oceanographic Office Washington D C
A. D. Zinova. 1967, 9p Rept no. N00-Trans-310 TT-67-62068
Spisok Morskikh Vodoroslei Yuzhnogo Sakhalina i Yuzhnykh Ostrovov Kurilskoi Gryady, trans. of Issledovaniya Fauny Morei (USSR), n6 p146-61 1959.

Descriptors: (*Algae, Pacific Ocean Islands), Marine biology, Distribution, Classification, USSR.

A new list of marine algae found in the Sakhalin and Kurile areas. The data are based on investigations by the Kurile Sakhaline Expedition and on other investigations. In the light of the new investigations, some corrections in taxonomic distribution of algae and their terminology are introduced.
AD-653 067 HC$3.00 MF$0.65

PBRFORMANCE OF SMALL MAMMALS AT LOW BODY TEMPERATURES.
Progress rept.,
Georgetown Univ Washington D C Dept of Biology
Joseph A. Panuska. 30 Apr 67, 17p
Contract DA-49-193-MD-2668

Descriptors: (*Hypothermia, Behavior), Mammals, Motor reactions, Performance tests, Body

temperature, Brain, Lipids, Cerebrovascular system, Blood circulation, Sulfoxides, Oxygen consumption.
Identifiers: Dimethyl sulfoxide.

The study evaluates the effect of progressively induced low body temperature on trained performance. Approaches to the cause or causes of performance failure at critical body temperature levels are also presented. The value of the performance temperature suppression method for further behavioral study is proposed. Trained heat reinforcement performance was suppressed in the guinea pig at the same body temperature range as was previously reported for the rat, 23 - 25C, several degrees above the level of complete motor collapse. Other rodents and other behavioral methods were also used in the performance evaluations of unrestrained hypothermic subjects. Physiological studies begun include regional brain lipid analysis and a measurement of cerebral blood flow under the conditions of the hypothermia behavioral studies. A supplementary study on the effect of Dimethylsulfoxide on cold-exposed animals revealed a significant depression of oxygen consumption. This is related to the previously reported acceleration of cooling rate. DMSO, however, caused no additional depression on heart rate during whole body cooling. (Author)
AD-653 127 HC$3.00 MF$0.65

GROUND TEMPERATURE DATA OF BIOLOGICAL SIGNIFICANCE.
Arctic Aeromedical Lab Fort Wainwright Alaska
For primary bibliographic entry see Field 13M.
AD-653 180 HC$3.00 MF$0.65

NASA CONTRACT LISTINGS OF PUBLICATIONS UNDER THE BEHAVIORAL BIOLOGY PROGRAM.
George Washington Univ., Washington, D. C. Biological Sciences Communication Project.
For primary bibliographic entry see Field 6S.
For abstract, see STAR 05 14.
N67-26503 HC$3.00 MF$0.65

THE EFFECT OF PROLONGED ACCELERATION ON GAS EXCHANGE AND RESISTANCE OF RATS TO HYPOXIA.
O Vliyanii Prodolzhitel'nykh Uskoreniy Na Gazoobmen I Ustoychivost'k Gipoksii U Krys
National Aeronautics and Space Administration, Washington, D. C.
A. A. Gyurdzhian. Nov 66, 5p NASA-TT-F-10406
Transl. Into English of A Paper Presented At the 17th Intern. Astronautical Congr., Madrid, 9-15 Oct. 1966

Descriptors: *Acceleration tolerance, *Gas exchange, *Hypoxia, *Rat, Acceleration, Biological, Centrifuge, Consumption, Effect, Exchange, Gas, Oxygen, Tolerance (biol).

For abstract, see STAR 05 14.
N67-26573 HC$3.00 MF$0.65

SELECTED STUDIES IN EXOBIOLOGY, PLANETARY ENVIRONMENTS, AND PROBLEMS RELATED TO THE ORIGIN OF LIFE SEMIANNUAL PROGRESS REPORT, 1 OCT. 1966 - 31 MAR. 1967.
Smithsonian Astrophysical Observatory, Cambridge, Mass.
C. Sagan. May 67. 8p NASA-CR-84461, SAPR-3
Contract NGR-09-015-023

Descriptors: *Astronomical model, *Planetary environment, *Telescope, Astronomical, Astrophysics, Atmosphere, Dust, Environment, Ionization, Laboratory, Mars (planet), Model, Observation, Photography, Planet, Solar, Theory, Wind.

For abstract, see STAR 05 14.
N67-27626 HC$3.00 MF$0.65

GROUND COVERS FOR HIGHWAY SLOPES. AN ANNOTATED BIBLIOGRAPHY,
Minnesota Univ., St. Paul. Dept. of Horticultural Science.
For primary bibliographic entry see Field 13B.
PB-173 809 HC$3.00 MF$0.65

OPERATION PLUMBOB. DISTRIBUTION, CHARACTERISTICS, AND BIOTIC AVAILABILITY OF FALLOUT,
California Univ., Los Angeles. Lab. of Nuclear Medicine and Radiation Biology.
For primary bibliographic entry see Field 18H.
For abstract, see NSA 21 02.
WT-1488 HC$3.00 MF$0.65

6D. BIONICS

DISTRIBUTED ADAPTATION IN NEUROMIME NETWORKS.
Interim rept., Jun 64-Jun 66,
Goodyear Aerospace Corp Akron Ohio Avionics and Electronics Research and Development Div
V. V. Griffith, and G. H. Bolen. Jan 67, 95p Rept no. GER-12738
AMRL-TR-66-225
Contract AF 33 (615)-1891

Descriptors: (*Bionics, Nervous system), (*Nerve cells, Mathematical models), Adaptive systems, Sequential analysis, Optimization, Feedback, Automation.

The report describes investigations of networks with adaptive ability distributed through them. It is thought that large-scale systems can be constructed of adaptive building blocks. These adaptive systems would be flexible in function, reliable and would resist severe damage characteristics of living creatures. Neuron models were tested by interconnecting them into various networks to perform simple control tasks. The test results were evaluated and the evaluation used to improve the theory and the neuron model. Two basic analysis methods were used to study neuromime networks: a sequential machine analysis and an optimal process method applying Pontryagin's maximum principle. The sequential analysis method proved unsatisfactory when applied to an attempted description of an adjustment rule for the neuron model. This difficulty led to an application of optimal processes. The application of Pontryagin's maximum principle to the analysis of the neuron model network described both optimum conditions for a system and criteria useful for developing the adjustment rule. (Author)
AD-652 853 HC$3.00 MF$0.65

THE GENERAL PROPERTIES OF LANGUAGE,
Massachusetts Inst of Tech Cambridge Research Lab of Electronics
For primary bibliographic entry see Field 5G.
AD-652 899 Not available from CFSTI.

SPEECH PROCESSING WITH A COCHLEAR-NEURAL ANALOG.
Final rept., 1 Apr 64-31 Mar 66,
Santa Rita Technology Inc Menlo Park Calif
John L. Stewart. Feb 67, 151p
AMRL-TR-66-229
Confract AF 33 (615)-1763
Report on project Biological Information Handling Systems and their Functional Analogs. See also AD-411 320.

Descriptors: (*Ear, Analog systems), (*Bionics, Ear), Electrophysiology, Psychoacoustics, Nerve cells, Hearing, Speech, Speech recognition, Auditory perception, Speech compression, Models (Simulations), Phonetics.

The investigation concerns activities pursued in improving our understanding of the nature of the ear's transformation of acoustic information to neural form. The current configuration of the analog ear developed by Santa Rita Technology is presented and design parameters are covered in detail. A model is proposed of a neural analyzer which extracts information from sound envelope fluctuations. These functional processes are thought to be similar to those employed by certain insects. By combining neural analysis with cochlear mechanisms, it has become possible to define a speech data pre-processing scheme which presents low-rate data in an almost phonetically-structured form to more central regions of the nervous system. Behavior of a physical neural analysis simulator is described and the nature of a complete phonetic-like speech display is estimated. (Author)
AD-653 207 HC$3.00 MF$0.65

6E. CLINICAL MEDICINE

RECOVERY FROM IMPULSE NOISE INDUCED ACOUSTIC TRAUMA,
Army Medical Research Lab., Fort Knox, Ky. Experimental Psychology Div.
J. L. Fletcher, and A. B. Cairns. 22 Nov 66, 10p
USAMRL-686

Descriptors: (*Hearing, Degradation), Noise, Audiometry, Frequency, Exposure, Army personnel, Recovery, Thresholds (Physiology), Speech, Audiofrequency.

Recovery from impulse noise induced acoustic trauma was examined in soldiers stationed at Fort Knox, Ky. Serial audiograms were obtained on the day of exposure, one day, three days, one week, two weeks, four weeks, six weeks, 12 weeks, four months, five months, and six months post exposure. Recovery from temporary threshold shifts as large as 35 dB was observed at frequencies from 500 - 2,000 cycles. At the higher frequencies shifts of magnitudes as great as 85 dB were observed with good recovery most of the time. Our results indicate that for legal purposes six months is a minimum waiting period necessary to substantiate permanent hearing loss. However, recovery at the speech frequencies is essentially complete in about two weeks. (Author)
AD-645 898 HC$3.00 MF$0.65

STUDIES ON THE APPLICATION OF A SKIN TEST FOR FILARIASIS IN THE ASSESSMENT OF THE STATUS OF TRANSMISSION.
Progress rept.,
Yokohama Municipal Univ (Japan) Faculty of Medicine
Shigeo Hayashi. Mar 67, 25p
ARDG (FE)-300-1
Contract DAJB17-67-C-0164

Descriptors: (*Filariae, Antigen-antibody reactions), Sensitivity, Diseases, Epidemiology, Immunity, Statistical analysis, Medical examination, Japan.
Identifiers: Skin tests.

The degree of transmission of filariid worms in a filariasis endemic area was studied. A skin test utilizing a purified fraction from the dog filaria, Dirofilaria immitis, was used as an antigen. Results of two skin tests carried out at a three-month interval on the same persons indicated those who had acquired a sensitization during the specified interval of time. In order to check the reproducibility of the test 215 persons of 15 to 16 years old in the Koniya Highschool were simultaneously skin tested two times. A statistical analysis revealed that the diameter indicates a significant change in the status of sensitization. More than 800 school children of 10 to 14 years of age in Koniya area were examined by the skin test once in September 1966

and again in December 1966 at a 3 month interval. It was observed that 170 or 20.53% of 828 children showed a significantly increased reactivity at the second test. A theoretical value of 18.29% was worked out from the observed figure. This suggested that in Koniya area around 18% of inhabitants were transmitted and sensitized by filarial worms during the period from September 66 to December 66. This may be considered to correspond to the degree of transmission of filarial worms in the area and to be an index of the degree of the endemicity. (Author)
AD-652 703 HC$3.00 MF$0.65

SOME OBSERVATIONS AND MEASUREMENTS OF THE PULFRICH PHENOMENON.
Army Medical Research Lab Fort Knox Ky
For primary bibliographic entry see Field 6L.
AD-652 705 HC$3.00 MF$0.65

THE RELATION OF INDUCED TINNITUS TO PHYSICAL CHARACTERISTICS OF THE INDUCING STIMULI.
Army Medical Research Lab Fort Knox Ky
For primary bibliographic entry see Field 5J.
AD-652 706 HC$3.00 MF$0.65

LASER HAZARDS BIBLIOGRAPHY, APRIL 1967,
Army Environmental Hygiene Agency Edgewood Arsenal Md
For primary bibliographic entry see Field 6R.
AD-652 707 HC$3.00 MF$0.65

MICROWAVE HAZARDS BIBLIOGRAPHY, APRIL 1967,
Army Environmental Hygiene Agency Edgewood Arsenal Md
For primary bibliographic entry see Field 6R.
AD-652 708 HC$3.00 MF$0.65

OPERATION AND MAINTENANCE MANUAL FOR ARMY ARTIFICIAL HEART PUMP.
Harry Diamond Labs Washington D C
Mar 65, 51p

Descriptors: (*Mechanical organs, *Heart), Pumps, Operation, Maintenance, Check valves, Pulse rate, Blood pressure, Cannulation, Cleaning, Sterilization, Performance (Engineering), Assembling.

The manual includes a description of the Army Artificial Heart Pump, as well as principles of operation, assembly instructions, operating instructions, maintenance procedures and the engineering parts list. Photographs of the Heart Pump and alternative types of valves used in the pump are included. (Author)
AD-652 736 HC$3.00 MF$0.65

PRIMARY MALIGNANT MELANOMA OF THE SKIN METASTATIC TO THE EYE AND ORBIT: REPORT OF TEN CASES AND REVIEW OF THE LITERATURE,
Armed Forces Inst of Pathology Washington D C
Ramon L. Font, Gottfried Naumann, and Lorenz E. Zimmerman. 1967. 18p
Availability: Published in American Journal of Ophthalmology v63 n4 p738-53 Apr 1967.

Descriptors: (*Eye, *Cancer), (*Skin, Cancer), Pathology, Histology, Diagnosis, Biopsy, Ophthalmology, Reviews.
Identifiers: Metastasis.

Ten cases of primary malignant melanomas of the skin which produced metastatic lesions to the eye and orbit are reviewed. The presenting ocular manifestations and histopathologic features, as well as the differential diagnosis, are discussed and illustrated. Review of the literature revealed only 17 acceptable cases of this entity. (Author)
AD-652 772 Not available from CFSTI.

BOLIVIAN HEMORRHAGIC FEVER: A PATHOLOGIC DESCRIPTION,
Armed Forces Inst of Pathology Washington D C
Proctor L. Child, Ronald B. MacKenzie, Luis R. Valverde, and Knrl M. Johsnon. 25 Nov 66. 12p
Availability: Published in Arch Path v83 p434-45 May 1967.

Descriptors: (*Virus diseases, Pathology), Epidemiology, Mortality rates, Diagnosis, Hemorrhage, Histology, Reticulo-endothelial system, Central nervous system, Gastrointestinal system, South America.
Identifiers: Hemorrhagic fever, Bolivia.

In 1963, an epidemic of viral hemorrhagic fever affected several hundred natives in San Joaquin, Bolivia. The mortality was 18%. This report describes the pathologic changes of Bolivian hemorrhagic fever based upon observations on eight cases that were autopsied during this epidemic. The clinical features were fever, myalgia, abdominal pain, and rash; lymphadenopathy was infrequent. Skin petechiae and ecchymoses, melena, and hematemesis were the most frequent hemorrhagic signs. There were neurologic changes, mainly disorientation, tremors, and convulsions, in all eight cases. Severe hypotension was followed by irreversible shock and death. The most striking pathologic findings in Bolivian hemorrhagic fever are congestion and interstitial hemorrhages in various organs, particularly of the gastrointestinal and central nervous systems. Microscopic changes were most characteristic in the liver. Acidophilic bodies, both within Kupffer cells and free within the hepatic sinusoids, were observed in all cases. (Author)
AD-652 776 Not available from CFSTI.

THE HISTOPATHOLOGIC BASIS FOR THE OCULAR MANIFESTATIONS OF THE CONGENITAL RUBELLA SYNDROME,
Armed Forces Inst of Pathology Washington D C
Lorenz D. Zimmerman. 20 Mar 67. 15p
Prepared for presentation at the William Hamlin Wilder Memorial Lecture (8th), Joint Meeting of the Institute of Medicine and the Chicago Ophthalmological Society, The Palmer House, March 20, 1967.
Availability: Published in Preceedings of the Institute of Medicine of Chicago v26 n8 Mar 1967.

Descriptors: (*Rubella, Infants), (*Eye, Pathology), Pregnancy, Anomalies, Ophthalmology, Etiology, Infections, Histology, Diagnosis, Diseases.

For 20 years following the first publications by Gregg, Swan, and their Australian colleagues, no significant advances were made toward establishing the pathogenesis of malformations due to congenital rubella infection. Recovery of the virus and the development of microbiologic methods for detection of rubella infection in asymptomatic subjects and in newborn babies, followed almost immediately by this country's first mnssive epidemics of the disease in many years, permitted the acquisition of an amazing amount of information and tremendous advances in our knowledge of the pathologic anatomy and pathogenesis of ocular changes due to the maternal rubella. Now it is firmly established that the ocular malformations observed in rubella babies are the result of actual infection of the affected tissues of the eye, and that this infection may persist for months after birth. The infection characteristically is accompanied by a low-grade uveitis that had not previously been recognized as a typical clinical feature of congenital rubella. Microscopic examination of the eye has established a number of histopathologic characteristics that should prove useful in the differential diagnosis of congenital cataracts and glaucoma due to rubella from similar malformations caused by other factors. (Author)
AD-652 780 Not available from CFSTI.

PERSISTENT HYPERPLASTIC PRIMARY VITREOUS IN AN ADULT: A BRIEF REVIEW OF THE LITERATURE AND A HISTOPATHOLOGIC STUDY,
Armed Forces Inst of Pathology Washington D C
A. G. Spaulding, and G. Naumann. 6 Oct 66. 7p
Availability: Published in Arch Ophthal v77 p666-71 May 1967.

Descriptors: (*Eye, Pathology), Adults, Histology, Diagnosis, Diseases, Anomalies, Ophthalmology.

The histopathologic findings in a case of persistent hyperplastic primary vitreous in a 22-year-old woman are reported. The resorbed lens and rotrolental mass were subluxated, and they were joined by patent vessels from the iris and the optic disc. Several other unusual findings are also recorded. (Author)
AD-652 781 Not available from CFSTI.

DAMAGE RISK CRITERION AND CONTOURS BASED ON PERMANENT AND TEMPORARY HEARING LOSS DATA,
Bolt Beranek and Newman Inc Cambridge Mass
For primary bibliographic entry see Field 6J.
AD-652 783 Not available from CFSTI.

HISTOGENESIS OF MALIGNANT MELANOMAS OF THE UVEA. II. RELATIONSHIP OF UVEAL NEVI TO MALIGNANT MELANOMAS,
Armed Forces Inst of Pathology Washington D C
Myron Yanoff, and Lorenz E. Zimmerman. 21 Jul 66. 15p
Availability: Published in Cancer v20 n4 p493-507 Apr 1967.

Descriptors: (*Eye, *Cancer), Etiology, Histology, Pathology, Cytology, Eye pigments, Neoplasms.

Many theories concerning the histogenesis of uveal melanomas have been advanced. While much clinical as well as histopathologic evidence is available to support the belief that most malignant melanomas of the iris have their origin in preexisting nevi, the histogenesis of melanomas of the choroid and ciliary body is much more controversial. A histopathologic study of 100 consecutive malignant melanomas of the choroid and ciliary body was undertaken in an effort to ascertain the frequency with which benign-appearing cells (nevus cells) might be found within or along the edges of the tumors. Such cells, cytologically identical with the cells constituting nevi of the uveal tract, were found in considerable numbers in 73 of the 100 melanomas. The authors conclude that most malignant melanomas, perhaps all such neoplasms, have their origin in pre-existing nevi. (Author)
AD-652 788 Not available from CFSTI.

LIPID CELL TUMORS OF THE OVARY,
Armed Forces Inst of Pathology Washington D C
Henry J. Norris. 1967. 1p
Availability: Published in Bulletin of Pathology v8 n2 p33 Feb 1967.

Descriptors: (*Ovaries, *Neoplasms), Lipids, Histology, Pathology, Cells (Biology).

An analysis of the clinical and pathologic findings of 30 ovarian lipid cell tumors confirmed Barzilai's view of their basic unity. There were no clinical

differences between those composed predominantly of hilus cells and those made up predominantly of adrenocortical cells; histologically there was considerable overlap. About one third of the cases, moreover, contained equal admixtures of both types of cells, making division impossible. Hilus cell tumors, even those with Reinke crystalloids, contained foci of cells resembling those of the adrenal cortex; likewise, those tumors composed predominantly of adrenal cortex-like cells contained areas of cells identical to hilus cells. (Author)
AD-652 791 Not available from CFSTI.

THE EFFECTS OF LASER IRRADIATION ON THE CENTRAL NERVOUS SYSTEM. I. PRELIMINARY STUDIES,
Armed Forces Inst of Pathology Washington D C
For primary bibliographic entry see Field 6R.
AD-652 792 Not available from CFSTI.

FACTORS CONTRIBUTING TO THE BALLISTOCARDIOGRAPHIC WAVE FORM IN HEALTHY MIDDLE AGED MALES,
Naval Aerospace Medical Inst Pensacola Fla
David H. Jackson, Albert Oberman, Robert E. Mitchell, and Ashton Graybiel. 19 May 66, 45p Rept no. NAMI-966
NAVMED-MF022.03.02-5007.12
NASA Order-R-136
Research supported in part by PHS.

Descriptors: (*Electrocardiography, Males), (*Males, Aging (Physiology)), Cardiovascular diseases, Aviation medicine, Diagnosis, Correlation techniques.

The availability of a large number of variables derived from clinical and laboratory evaluations of 200 middle aged males made it possible to relate them statistically to the BCG waves. Numerous significant correlations were found and these are discussed. It appears that, until the factors and their interrelationships are more precisely evaluated, the strictly quantitative use of BCG standards derived from groups to determine such things as stroke volume, among others, must be regarded with caution. The results seem to indicate that serial BCG's will be necessary for complete evaluation of an individual's cardiovascular status. (Author)
AD-652 811 HC$3.00 MF$0.65

DENTAL CARIES INCREMENTS EVALUATED BY USE OF BITE-WING ROENTGENOGRAMS,
Naval Submarine Medical Center Groton Conn Medical Research Lab
William R. Shiller, J. C. Dittmer, L. P. McElwaine, and F. P. Scola. 15 May 67, 12p Rept no. SMRL-495
NAVMED-MR005.19-6042.02
Availability: Published in Military Medicine v132 n4 p298-305 Apr 1967.

Descriptors: (*Teeth, X rays), Dentistry, Military medicine, Naval personnel, Diseases, Fluorides, Tin compounds.

Dental caries increments are difficult to assess in a military population because re-examination must be performed over a rather long period of time. A simplification of caries assessment is described. Routinely exposed posterior bite-wing X-rays were analyzed and caries reduction rates in a stannous fluoride study were compared with those obtained by a usual complete clinical examination. In all respect the results from the X-ray evaluation were comparable to the complete examination results. A great saving in effort and a new capability for doing caries studies in the Navy is expected to result from the application of these results. (Author)
AD-652 936 Not available from CFSTI.

NONOLIGURIC ACUTE RENAL FAILURE,
Brooke Army Medical Center Fort Sam Houston Tex Army Surgical Research Unit
Robert M. Vertel, and James P. Knochel. 1967, 5p
Availability: Published in The Journal of the American Medical Association v200 p598-602 May 15 1967.

Descriptors: (*Burn, Pathology), (*Kidneys, Pathology), Urea, Blood chemistry, Urine, Histology, Diagnosis.

Eleven cases of nonoliguric acute renal failure, all but one following burns, as well as 14 cases of postburn oliguric acute renal failure, have been treated at the US Army Surgical Research Unit since 1960. Mild azotemia not attributed to parenchymal renal failure occurred in an additional ten burned patients. The urine sodium concentration exceeded 20 mEq/liter in eight of 11 patients with oliguric acute renal failure, whereas only one of nine nonoliguric patients had a urine sodium concentration above 20 mEq/liter. Thus, a low urine sodium concentration is not helpful in distinguishing functional renal insufficiency from parenchymal renal failure unless oliguria is present. (Author)
AD-652 942 Not available from CFSTI.

SHOCK IN THE MULTIPLE-INJURY PATIENT,
Brooke Army Medical Center Fort Sam Houston Tex Army Surgical Research Unit
John A. Moncrief. 1967, 8p
Prepared for presentation as an Instructional Course Lecture, The American Academy of Orthopaedic Surgeons.
Availability: Published in The Journal of Bone and Joint Surgery v49A n3 p540-6 Apr 1967.

Descriptors: (*Shock (Pathology), Therapy), Wounds + injuries, Diagnosis, Blood volume, Tissues (Biology), Hematocrit, Hemoglobin, Urine, Blood transfusions, Diuretics, Plasma substitutes, Vasoactive agents, Respiration, Metabolic diseases, Acid-base equilibrium, Septicemia.

Shock is a physiologic state due to a variety of causes. These causes must be identified and therapy directed accordingly. The conditions resulting from or perpetuating shock must also be corrected before a successful outcome can be anticipated. (Author)
AD-652 945 Not available from CFSTI.

RESPIRATORY COMPLICATIONS IN THE ACUTELY BURNED PATIENT: A CLINICAL STUDY,
Brooke Army Medical Center Fort Sam Houston Tex Army Surgical Research Unit
Arnold I. Walder, William T. Summerlin, Arthur D. Mason, Jr., Franklin D. Foley, and John A. Moncrief. 1967, 6p
Availability: Published in Military Medicine v132 n5 p379-84 May 1967.

Descriptors: (*Burns, Respiratory diseases), Pathology, Metabolic diseases, Diagnosis, Therapy, Bacteria, Hypoxia, Biopsy, Steroids.

Eighteen per cent of patients entering the Surgical Research Unit Burn Study Branch develop an unusual syndrome, characterized by tachypnea appearing on or about the sixth postburn day, followed by the rapid development of auscultatory and roentgen evidence of bronchopneumonia. A large base deficit exists in the presence of respiratory alkalosis. The patients ultimately develop metabolic acidosis and deteriorate rapidly. Appropriate treatment includes expansion of atelectatic pulmonary parenchyma by voluntary hyperventilation, use of blow bottles, and intermittent positive pressure ventilation. Frequent, judicious bronchoscopy is an invaluable tool for bronchial aspiration and lavage and the stimulation of a productive cough. The use of prolonged mechanical ventilation and bronchodilators is described. (Author)
AD-652 946 Not available from CFSTI.

CARDIOVASCULAR EFFECTS OF EXPERIMENTAL HEAD INJURY IN THE MONKEY,
Naval Medical Research Inst Bethesda Md
Eugene S. Flamm, Ayub K. Ommaya, John Coe, Thomas P. Krueger, and Fred H. Faas. 1966, 5p
NAVMED-MR005.04.0037-13
Availability: Published in Surgical Forum v17 p414-6 1966.

Descriptors: (*Head, Wounds + injuries), Cardiovascular system, Electrocardiography, Blood pressure, Pulse rate, Blood circulation, Monkeys.

The relationship between experimental cerebral concussion and changes in the cardiovascular physiology of the Rhesus monkey was studied. It was found that immediately after the head trauma the diastolic blood pressure was lowered and the heart rate slowed. These changes could be prevented by bilateral vagotomy. Only the heart rate and rhythm changes and changes in the form of the electrocardiogram could be statistically related to the production of concussion. Carotid angiograms revealed prolongation of the circulation time after concussion. The implication of these findings in the clinical situation are discussed. (Author)
AD-653 035 Not available from CFSTI.

WHOLE ORGAN FREEZING AND THAWING HEAT TRANSFER AND THERMAL PROPERTIES.
Annual rept., 1 Apr 66-31 Mar 67,
Geoscience Ltd La Jolla Calif
H. F. Poppendiek, N. D. Greene, R. Randall, and H. G. Furgerson. 31 Mar 67, 35p Rept no. GLR-54
Contract Nonr-4095 (00)
See also AD-646 333.

Descriptors: (*Cryogenics, Tissues (Biology)), (*Tissues (Biology), Freezing), (*Thermal conductivity, Tissues (Biology)), Ice, Liver, Bovines, Water, Calorimeters, Design, Calibration, Kidneys, Skin, Spleen, Heart, Heat transfer, Numerical analysis, Graphics, Preservation, Storage, Thermal properties.

An alternate thermal conductivity device (cylindrical geometry) has been constructed and used to compliment the flat plate apparatus. Some thermal conductivity measurements for ice over the temperature range of 20F to -320F have been obtained and compared to literature values. Some difficulties have been encountered with entrapped air. Conductivity measurements for bovine liver in the unfrozen and frozen states were also made and compared to the behavior of water and ice. On the basi[s] of the composition of liver, the results for li[v]er were in reasonable agreement with the data for ice and water. A thermal gradient calorimeter has been designed, fabricated, calibrafed and used to study the heat capacities of biological specimens. Heat capacity measurements have been made for ice, water, frozen bovine liver, kidney, skin, spleen, heart and calf liver. These heat capacity measurements were compared to the values known for water and ice. A graphical or numerical heat transfer procedure has been used to perform freezing calculations that are applicable to transient freeze-thaw heat transfer in organ and tissue storage. Specifically, the time-temperature histories in idealized slab organs with different amounts of water content have been calculated. Also, an analytical heating solution has been derived that defines the initial portion of the thawing history in a biological material that has embedded iron particles that are heated by electromagnetic induction. (Author)
AD-653 101 HC$3.00 MF$0.65

AN OPERATIONAL CONCEPT OF AN EMERGENCY MEDICAL COMMAND AND COMMUNICATIONS SYSTEM.
Serendipity Associates Los Altos Calif

For primary bibliographic entry see Field 15C.
AD-653 105 HC$3.00 MF$0.65

A COMPREHENSIVE STUDY OF VIRAL HEPATITIS.
Johns Hopkins Univ Baltimore Md Dept of Pathology
For primary bibliographic entry see Field 6M.
AD-653 161 HC$3.0 MF$0.65

NODULAR THECA-LUTEIN HYPERPLASIA OF PREGNANCY (SO-CALLED 'PREGNANCY LUTEOMA'),
Armed Forces Inst of Pathology Washington DC
Henry J. Norris, and Herbert B. Taylor. 12 Aug 66, 11p
Availability: Published in American Journal of Clinical Pathology v47 n5 p557-66 1967.

Descriptors: (*Ovaries, *Neoplasms), (*Pregnancy, Neoplasms), Diagnosis, Etiology, Histology, Pathology, Toxicity.

A clinical and pathologic analysis of 15 pregnancy luteomas, as defined by Sternberg, is presented. Occurring in pregnant women, usually at term, the lesions are benign and rarely cause symptons, although they may be associated with slight virilization and toxemia of pregnancy and may reach a size sufficient to obstruct the birth canal or to be detected clinically. Pregnancy luteomas are often multiple (nine examples), are occasionally bilateral (three examples), and regress after delivery. They are associated with marked luteinization of the cortical stroma and with abnormally increased numbers of theca-lutein cysts, and they appear to arise from hyperplastic overgrowth of the theca-lutein cells in theca-lutein cysts. Because of these factors, we believe that pregnancy luteomas are nodular hyperplasias of theca-lutein cells, not true adenomas. Therefore, the term 'nodular theca-lutein hyperplasia of pregnancy' is favored because it is a more accurate designation and avoids confusion with the various ovarian neoplasms referred to as 'luteomas'. Pregnancy luteomas are not related to pre-existing ovarian stromal tumors, lipid cell tumors, or the corpus luteum of pregnancy. The criteria for distinguishing these four lesions are discussed. (Author)
AD-653 229 Not available from CFSTI.

FACTORS CONTRIBUTING TO THE BALLISTOCARDIOGRAPHIC WAVE FORM IN HEALTHY MIDDLE AGED MALES.
Naval School of Aviation Medicine, Pensacola, Fla.
A. Graybiel, D. H. Jackson, R. E. Mitchell, and A. Oberman. May 66, 41p NASA-CR-84436, NAMI-966
NASA ORDER R-136

Descriptors: *Ballistocardiography, *Human factor, *Waveform, Cardiovascular, Correlation, Factor, Human, Standard, Statistical, System, Variable.

For abstract, see STAR 05 14.
N67-27435 HC$3.00 MF$0.65

SOVIET APPLICATION OF CYBERNETICS IN MEDICINE: ARTIFICIAL LIMBS.
Mar 67, 34p PAL-67-1

Descriptors: (*Prosthetics, USSR), Artificial limbs, Extremities, Electromyography, Control systems, Feedback, Cybernetics, Hands, Arms, Electrophysiology, Automation, Muscles, Amputation stumps, Effectiveness.

In 1958, the Soviet Central Institute of Prosthetics Research and Development built the Kobrinskiy arm prosthesis and presented it to the scientific community for the first time in 1960. This achievement in a fundamentally new direction in prosthetics by Soviet scientists was aided by advances in biocybernetics, electrophysiology, semiconductor electronics, and automatic control. Prostheses of this type are controlled by bioelectric currents derived from muscles of the arm or leg stumps. Control of the Kobrinskiy arm is provided by muscle currents obtained from flexor and extensor muscles of the patient's arm stump. The artificial arm is judged to be cosmetically good, easily fitted to the patient, light in weight, and functionally reliable. (Author)
PB-174 827 HC$3.00 MF$0.65

6F. ENVIRONMENTAL BIOLOGY

AN ECOLOGICAL STUDY ON THE EFFECTS OF CERTAIN CONCENTRATIONS OF CACODYLIC ACID ON SELECTED FAUNA AND FLORA.
Final rept., 23 Apr-26 Jul 65,
Vitro Corp of America Eglin AFB Fla Vitro Services Div
Kelly H. Oliver, Jr., Gary H. Parsons, and C. T. Huffstetler. Sep 66, 31p
APGC-TR-66-54
Contract AF 08 (635)-5150

Descriptors: (*Arsenic compounds, *Herbicides), Ecology, Agriculture, Toxicity, Trees, Vertebrates, Amphibians, Reptiles, Birds, Mammals, Grasses, Algae, Chlorophylls, Oxygen, Fishes, Insects, Toxic tolerances, Dosage, Effectiveness, Forestry.

A study was made of the effects of cacodylic acid on the flora and fauna of specific ecotones. Approximate lethal dosages have been determined for specific plants and animals under certain conditions. The five ecotones, sandhills, hammock, grasslands, pond and stream, are briefly characterized and the effects of cacodylic acid on the inhabitants of each are summarized. (Author)
AD-652 852 HC$3.00 MF$0.65

1964 ENVIRONMENTAL MONITORING RADIATION LEVELS AT BROOKHAVEN NATIONAL LABORATORY,
Brookhaven National Lab., Upton, N. Y.
A. P. Hull. Jun 66, 34p
Contract AT (30-2)-GEN-16

Descriptors: (*Radiation monitors, *Radiation measurement systems), (*Radioactive waste, Disposal), (*Radioactive fallout, *Research reactors), Environment, Ecology, Iodine, Radioactive isotopes.

For abstract, see NSA 21 12.
BNL-50001 HC$3.00 MF$0.65

SEMIANNUAL PROGRESS REPORT FOR THE PERIOD ENDING DECEMBER 31, 1966.
California Univ., Los Angeles. Lab. of Nuclear Medicine and Radiation Biology.
For primary bibliographic entry see Field 6R.
For abstract, see NSA 21 12.
UCLA-12-612 HC$3.00 MF$0.65

6G. ESCAPE, RESCUE, AND SURVIVAL

GROUND TEMPERATURE DATA OF BIOLOGICAL SIGNIFICANCE
Arctic Aeromedical Lab Fort Wainwright Alaska
For primary bibliographic entry see Field 13M.
AD-653 180 HC$3.00 MF$0.65

6H. FOOD

ANALYSIS OF U. S. ARMY FOOD PREFERENCE SURVEY (1963).
Technical rept.,
Peryam and Kroll Research Corp Chicago Ill
Jose h M. Kamen, David B. Peryam, David R. Peryam, and Beverley J. Kroll. Mar 67, 411p
USA-NLABS-TR-67-15-PR
Contract DA-19-129-AMC-719 (N)

Descriptors: (*Military rations, Acceptability), Army personnel, Questionnaires, Food, Beverages, Bread, Cereals, Fruits, Vegetables, Potatoes, Meat, Statistical analysis, Sampling, Tables.

In February, 1963, a survey of food preferences was conducted in which a sample of over 20,000 men randomly selected from among Army enlisted personnel in the Zone of the Interior participated. Techniques were essentially the same as those used in surveys made in 1950-1956. Information was obtained about each respondent's current military status and about certain features of his background. Each of 263 food names was rated on the 9-point hedonic scale by about 2000 men. For purposes of analysis the foods were grouped into 11 classes. The relationship between preferences and respondent's background was examined for 13 characteristics. Estimates of the sampling error of the results were developed. The reproducibility of previous results for identical foods was good -- a correlation of +.94. The major presentation of results is in the form of 263 individual food summary tables and 11 food class s ...mary tables. (Author)
AD-652 910 HC$3.00 MF$0.65

CHANGES IN TBA VALUE OF MEAT UNDER CONTROLLED CONDITIONS.
Final rept., 30 Jun-31 Dec 65,
Missouri Univ Columbia
M. E. Bailey, V. C. Witte, and G. F. Krause. Apr 67, 68p
FD-55, USA-NLABS-TR-67-67-FD
Contract DA-19-129-AMC-638 (N)

Descriptors: (*Beef, Test methods), (*Pork, Test methods), Barbiturates, Fats, Chemical analysis, Meat, Deterioration, Oxidation, Storage, Freezing, Tables.

The report summarized work done to determine the effects of cooler and freezer storage on TBA (thiobarbituric acid) values of ground uncooked pork and beef and their relationship to pH and percent fat. TBA values of pork were determined by distillation and extraction methods and those of beef were determined by the latter method. The TBA values determined were relatively low during storage from 2 to 7 days at 38F and from 1 to 7 days at -3F. There were significant animal differences in beef and pork in TBA values, percent fat and pH. There were significant changes in TBA values due to 38F - storage, pH and percent fat, but changes during freeze-storage were insignificant. (Author)
AD-652 911 HC$3.00 MF$0.65

IRRADIATION PRESERVATION OF FRESHWATER FISH AND INLAND FRUITS AND VEGETABLES.
Final rept.,
Michigan State Univ., East Lansing.
J. A. Emerson, R. H. Gnaedinger, P. Markakis, R. C. Nicholas, and L. L. Kempe. Aug 66, 62p
Contract AT-11-1-1283
Prepared in cooperation with Bureau of Commercial Fisheries, Ann Arbor, Mich., and Michigan Univ., Ann Arbor. For abstract see NSA 21 05.

Descriptors: (*Irradiated foods, Fruits), (*Vegetables, Irradiated foods), Preservation, Fishes, Pasteurization, Storage, Refrigeration systems, Taste, Odors, Gamma rays.

Data presented herein confirm observations reported in the previous annual reports by indicating that irradiation pasteurization can significantly extend the refrigerated storage life of freshwater fish and of inland fruits and vegetables. Preliminary studies with other foods suggest additional possible beneficial effects of preirradiation; for example, irradiated prunes dehydrated more rapidly, irradiated apple juice did not spoil as quickly, and the storage life of mushrooms was extended by irradiation. It was also evident that extension of the refrigerated storage life of fish and fruits by radiation pasteurization yields the best results when these products are gently handled under sanitary conditions throughout all stages of harvesting, processing, storage and transportation.
COO-1283-40 HC$3.00 MF$0.65

COST-BENEFIT STUDY OF SELECTED PRODUCTS IN ATOMIC ENERGY COMMISSIONS LOW-DOSE FOOD IRRADIATION PROGRAM.
Daniel Yankelovich, Inc., New York.
Dec 66, 242p
Contract AT (30-1)-3666

Descriptors: (*Irradiated foods, Costs), (*Radiological dosage, Fruits), (*Seafood, Preservation), Attitudes, Vegetables, Frozen foods, Economics, Money.

For abstract, see NSA 21 12.
NYO-3666-1 HC$3.00 MF$0.65

FOOD PRODUCE IN THAILAND.
Coordination Center for Southeast Asian Studies, Bangkok (Thailand).
For primary bibliographic entry see Field 5C.
PB-174 781 HC$3.00 MF$0.65

6J. INDUSTRIAL (OCCUPATIONAL) MEDICINE

LASER HAZARDS BIBLIOGRAPHY, APRIL 1967,
Army Environmental Hygiene Agency Edgewood Arsenal Md
For primary bibliographic entry see Field 6R.
AD-652 707 HC$3.00 MF$0.65

MICROWAVE HAZARDS BIBLIOGRAPHY, APRIL 1967,
Army Environmental Hygiene Agency Edgewood Arsenal Md
For primary bibliographic entry see Field 6R.
AD-652 708 HC$3.00 MF$0.65

DAMAGE RISK CRITERION AND CONTOURS BASED ON PERMANENT AND TEMPORARY HEARING LOSS DATA,
Bolt Beranek and Newman Inc Cambridge Mass
K. D. Kryter. 1965, 11p
Contract DA-49-193-MD-2235
Availability: Published in American Industrial Hygiene Association v26 p34-44 Jan-Feb 1965.

Descriptors: (*Hearing Protection), (*Industrial medicine, *Deafness), Thresholds (Physiology), Audiometry, Speech recognition, Noise, Exposure.

A damage risk criterion is proposed that provides more protection for the frequency region of hearing important to speech perception than to other areas. Damage risk contours are drawn to this criterion on the basis of rather detailed temporary threshold shift data obtained in the laboratory. The TTS2 found in young adults with normal hearing, from an eight-hour exposure to a noise has about the same numerical magnitude as the NIPTS in industrial workers exposed for 10 or more years, eight hours per workday, to about the same noise; it is concluded that TTS data can be used as a reasonably valid secondary yardstick for assessing the potential damage risk for permanent threshold shifts due to exposure to noise. The damage risk contours proposed represent a degree of calculated risk for persons exposed to the levels, spectra, and daily durations specified. This risk can best be met by lowering the levels specified by 10 db or so; if this is not practical, a program for monitoring the hearing of noise-exposed workers could be used in order to detect, and remove from the noise, those workers showing significant permanent threshold shifts. (Author)
AD-652 783 Not available from CFSTI.

6K. LIFE SUPPORT

A REVIEW OF GAS CHROMATOGRAPHIC-MASS SPECTROMETRIC METHODS OF ANALYSIS.
Naval Research Lab Washington D C
For primary bibliographic entry see Field 7D.
AD-652 823 HC$3.00 MF$0.65

FIRE PROTECTION FOR OXYGEN ENRICHED ATMOSPHERE APPLICATIONS,
Air Force Aero Propulsion Lab Wright-Patterson AFB Ohio
For primary bibliographic entry see Field 13L.
AD-653 113 HC$3.00 MF$0.65

ANALYSIS OF SELF-LOCOMOTIVE PERFORMANCE OF LUNAR EXPLORERS BASED ON EXPERIMENTAL REDUCED-GRAVITY STUDIES.
National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
D. E. Hewes. May 67, 21p NASA-TN-D-3934
Contract 127-51-03-02-23

Descriptors: *Astronaut locomotion, *Human performance, *Lunar gravitational effect, *Metabolism, Astronaut, Cost, Cycle, Effect, Exploration, Fatigue, Gravitational, Human, Locomotion, Lunar, Performance, Pressure, Simulation, Slope, Suit, Surface.

For abstract, see STAR 05 14.
N67-26542 HC$3.00 MF$0.65

MODELLING ENERGY EXCHANGE PROCESSES IN ECOLOGICAL SYSTEMS.
Modelirovaniye Protessessov Energoobmena V Ekologicheskikh Sistemakh
National Aeronautics and Space Administration, Washington, D. C.
A. B. Rubin. Nov 66, 5p NASA-TT-F-10408
Transl. Into English of A Paper Presented At the 17th Intern. Astronautical Congr., Madrid, 9-15 Oct. 1966

Descriptors: *Closed ecological system, *Energy exchange, *Mathematical model, Closed, Differential, Ecology, Energy, Equation, Exchange, Mass, Mathematics, Model, Nonlinear, Process, System.

For abstract, see STAR 05 14.
N67-26567 HC$3.00 MF$0.65

THE PROBLEM OF PROLONGED, AUTONOMOUS HUMAN EXISTENCE IN A SPACE SUIT.
K Probleme Dlitel'nogo Autonomnogo Sushchetstvovaniya Cheloveka V Kosmicheskom Skafandre
National Aeronautics and Space Administration, Washington, D. C.
A. M. Genin, and L. G. Golovkin. Nov 66, 9p
NASA-TT-F-10413
Transl. Into English of A Paper Presented At the 17th Intern. Astronautical Congr., Madrid, 9-15 Oct. 1966

Descriptors: *Space suit, *Sweat cooling, *Temperature control, Astronaut, Balance, Capacity, Control, Cooling, Exchange, Feasibility, Heat, Performance, Space, Suit, Sweat, Temperature.

For abstract, see STAR 05 14.
N67-26575 HC$3.00 MF$0.65

THE TRANSFORMATION OF HUMAN METABOLIC PRODUCTS AND PRODUCTS OF A BIOLOGICAL COMPLEX DURING THE RECIRCULATION OF SUBSTANCES IN SMALL, CLOSED SPACES.
National Aeronautics and Space Administration, Washington, D. C.
For primary bibliographic entry see Field 6S.
For abstract, see STAR 05 14.
N67-26576 HC$3.00 MF$0.65

6L. MEDICAL AND HOSPITAL EQUIPMENT

SOME OBSERVATIONS AND MEASUREMENTS OF THE PULFRICH PHENOMENON.
Interim rept.,
Army Medical Research Lab Fort Knox Ky
George S. Harker, and Orvil L. O'Neal, Jr. 9 May 67, 16p
USAMRL-728

Descriptors: (*Vision, Test equipment), Space perception, Ophthalmology, Visual perception, Psychophysics, Visual acuity, Anomalies.

The Pulfrich pendulum was evaluated as a potential screening device for the detection of anomalies of binocular vision. For this purpose, a booth was set up at the Kentucky State Fair (1964) and the general public invited to observe the pendulum and record their responses with the equipment provided. The obtained results indicate that a clear dichotomy can be achieved between those who have binocular vision and those who do not. However, gradations of binocular vision from poor to good cannot be achieved with the pendulum as presently understood. Contrary to explanatory theory the characteristic seen shape of the seen pendulum path was asymmetrical following the rule that the path was displaced away from the observer on the side of the filtered eye. (Author)
AD-652 705 HC$3.00 MF$0.65

DEVELOPMENT OF A PULSED X-RAY TELEVISION FLUOROSCOPE FOR BIODYNAMIC RESEARCH.
Final rept., Aug 63-May 66,
Admiral Corp Chicago Ill
E. B. Weis, Jr., W. Q. Leysath, and K. R. Horning. Mar 67, 50p
AMRL-TR-66-189
Contract AF 33 (615)-1878
See also AD-650 481.

Descriptors: (*Acceleration tolerance, *Radiography), (*Fluoroscopes, Television equipment), X-ray photography, Medical examination, Vibration, Instrumentation, Design, Radiological dosage, Monitors, Effectiveness, Space medicine.

The work presents a logical picture of a biodynamics instrumentation requirement, a design to answer the requirement, testing of the prototype, evaluation of the quality of the prototype, and a discussion of the advantages and limitations of the design. The operational nature of a high-speed X-ray device with certain advantages for biodynamic research is discussed. The final nature of the device is found to have certain advantages over commercially available X-ray units for general medical

research purposes as well as for general clinical radiology. (Author)
AD-652 851 HC$3.00 MF$0.65

RAPID CALIBRATION OF MICROTITRATION DILUTING LOOPS BY REFRACTIVE INDEX METHODS,
Naval Medical Research Unit No 4 Great Lakes Ill
E. A. Edwards, and R. Peck. 2 Mar 64, 19p
NAVMED-MR005.09-1300.1

Descriptors: (*Laboratory equipment, Calibration), (*Microanalysis, Laboratory equipment), Serodiagnosis, Pipettes, Refractive index, Volumetric analysis.

A rapid and simple method for calibrating the wire diluting loop used in the microtitration method is described. Favorable comparisons of the wire loop, with accepted pipetting procedures, were obtained in making serum dilutions utilizing a refractive index technic. The diluting loop has to its advantage the rapidity of making from 3-6 simultaneous dilutions using only 0.025 ml volume increments. With an easy method of calibrating the loops, any laboratory should be able to use the micro method with the confidence that is no.. given the conventional glass pippeting method.
AD-653 125 HC$3.00 MF$0.65

NEW SUBMINIATURE AMPLIFIER-TRANSMITTERS FOR TELEMETERING BIOPOTENTIALS,
Worcester Polytechnic Inst Mass
For primary bibliogmphic entry see Field 9F.
AD-653 319 Not available from CFSTI.

AN EXPERIMENT IN USING MICROCUVETTES. MANUFACTURE OF THIN GLASS STRIPS, PLATES, AND COVER GLASSES BY DRAWING SHEET GLASS.
Opyt Primeneniya Mikrokyuvet. Izgotovleniye Tonkikh Steklyannykh Lent, Plastin I Pokrovnykh Stekol Rastyagivaniyem Listovogo Stekla
National Aeronautics and Space Administration. Washington, D. C.
D. R. Gabe, and B. V. Perfilyev. Feb 67, 19p
NASA-TT-F-10728
Transl. Into English From the Book 'capillary Methods of Investigating Microorganisms" Moscow, Izd. Akad. Nauk Sssr, 1961 P 213-221, 463-470

Descriptors: *Culture (biol), *Glass, *Microscopy, *Thin plate, Cover, Cuvette, Growth, Manufacturing, Observation, Plate, Sheet, Strip, Thin.

For abstract, see STAR 05 14.
N67-26578 HC$3.00 MF$0.65

DESIGN OF AN OPTOMETER AND TWO-DIMENSIONAL EYE TRACKER FINAL REPORT.
Stanford Research Inst., Menlo Park, Calif.
T. N. Cornsweet, and H. D. Crane. Apr 67, 67p
NASA-CR-73088
Contract NAS2-3517

Descriptors: *Eye movement, *Optometer, *Position indicator, *Tracking, Cornea, Design, Dimensional, Double, Eye, Image, Indicator, Infrared, Lens, Measurement, Mirror, Movement, Pattern, Position, Real, Reflection, Refraction, Rotation, Separation, Spatial, Time, Two.

For abstract, see STAR 05 14.
N67-26588 HC$3.00 MF$0.65

6M. MICROBIOLOGY

RAPID CALIBRATION OF MICROTITRATION DILUTING LOOPS BY REFRACTIVE INDEX METHODS,
Naval Medical Research Unit No 4 Great Lakes Ill
For primary bibliographic entry see Field 6L.
AD-653 125 HC$3.00 MF$0.65

A COMPREHENSIVE STUDY OF VIRAL HEPATITIS.
Annual progress rept., 15 Jul 66-14 Jul 67,
Johns Hopkins Univ Baltimore Md Dept of Pathology
Boris H. Ruebner. 13 May 67, 14p
Contract DA-49-193-MD-2310

Descriptors: (*Hepatitis viruses, Diseases), (*Infectious hepatitis, Reports), Pathology, Growth, Tissue culture, Mycoplasma, Rubella, Liver, Neoplasms, Fluorescent antibody techniques, Immune serums, Tissue culture cells, Infants, Electron microscopy, Histology.

Contents: A Study of Viral Agents from Human Infectious Hepatitis; Human Viral Hepatitis with Particular Reference to Mycoplasma; Hepatic Lesions in Congenital Rubella; Electron Microscopy of Some Human Hepatomas; Fluorescent Studies of Virus Hepatitis in Mice.
AD-653 161 HC$3.00 MF$0.65

FURTHER STUDIES ON STEROL STIMULATION OF SEXUAL REPRODUCTION IN PYTHIUM,
National Research Council of Canada Saskatoon (Saskatchewan) Prairie Regional Lab
J. H. Sietsma, and R. H. Haskins. 30 Sep 66, 7p
NRC-9432
Availability: Published in Canadian Journal of Microbiology v13 p361-6 1967.

Descriptors: (*Reproduction (Physiology), Cholesterol), (*Fungi, Reproduction (Physiology)), Amino acids, Stimulation, Metabolism, Culture media, Growth, Canada.

The influence of amino acids on the stimulatory activity of cholesterol on the production of oogonia by a species of Pythium is reported. None of the sterols tested was metabolized by the fungus, but the sterols which do affect oogonia production were adsorbed, unchanged by the organism, and probably incorporated in the cell membrane. The organism survived higher temperature when grown on a medium containing cholesterol than when grown on a medium without cholesterol. (Author)
AD-653 388 Not available from CFSTI.

IRRADIATION PRESERVATION OF FRESHWATER FISH AND INLAND FRUITS AND VEGETABLES.
Michigan State Univ., East Lansing.
For primary bibliographic entry see Field 6H.
For abstract, see NSA 21 05.
COO-1283-40 HC$3.00 MF$0.65

PURIFICATION AND PROPERTIES OF RIBONUCLEIC ACID POLYMERASE FROM ESCHERICHIA COLI,
Los Alamos Scientific Lab., N. Mex.
Robert L. Ratliff, David A. Smith, and Theodore T. Trujillo. Dec 66, 28p
Contract W-7403-eng-36

Descriptors: (*Escherichia coli, *Ribonucleic acids), Purification, Enzymes, Amino acids, Proteins.

For abstract, see NSA 21 12.
LA-3638 HC$3.00 MF$0.65

AN EXPERIMENT IN USING MICROCUVETTES. MANUFACTURE OF THIN GLASS STRIPS, PLATES, AND COVER GLASSES BY DRAWING SHEET GLASS.
National Aeronautics and Space Administration. Washington, D. C.
For primary bibliographic entry see Field 6L.
For abstract, see STAR 05 14.
N67-26578 HC$3.00 MF$0.65

LIFE IN EXTRATERRESTRIAL ENVIRONMENTS QUARTERLY STATUS REPORT, FEB. 15 - MAY 31, 1967.
IIT Research Inst., Chicago, Ill.
May 67, 40p NASA-CR-84516, IITRI-I 6023-9
Contract NASR-22

Descriptors: *Bacteria, *Extraterrestrial environment, *Growth, *Soil, *Survival, Diurnal, Ecology, Environment, Extraterrestrial, Moisture, Simulation, Temperature, Variation.

For abstract, see STAR 05 14.
N67-27674 HC$3.00 MF$0.65

PREPARATION AND DEVBLOPMENT OF REAGENTS FOR THE PICORNAVIRUSES.
Semi-annual contract progress rept. 1 Mar-1 Sep 66,
Kansas Univ., Kansas City. Medical Center.
Herbert A. Wenner. 1 Sep 66, 33p
Contract PH 43-64-529

Descriptors: (*Enteroviruses, Immune serums), Antigens + antibodies, Coxsackie virus, Echo virus, Geese, Goats, Monkeys, Preparation, Standardization, Tables.
Identifiers: Picornaviruses, Rhinoviruses, Reoviruses.

Virus stocks and antisera prepared for ECHO 33 and A19 were fully tested for purity and for antibody characteristics respectively. Of 7 candidate picornaviruses 5 appear to be new serotypes. Of the 2 remaining, one (V1880/71) is related to coxsackievirus A24; another (Toluca-4) is related to echovirus type 30. The echovirus type 12 virus pool contains echovirus type 1. Virus stocks were prepared for 27 rhinoviruses. Nineteen stocks were certified type-specific. The 19 are free of PPLO. A fraction of each pool was purified by treatment with genetron. Ten of the rhinovirus pools are being used for inoculation of goats. Data relating to the production, in geese of reovirus antisera are presented and antibody titers while lower than those produced in monkeys, were type-specific. Data are presented giving serologic cross-reactivity among 2 simian picornaviruses and 3 simian reoviruses. (Author)
PB-173 604 HC$3.00 MF$0.65

FEASIBILITY STUDY: PARAINFLUENZA VIRUS ISOLATED ANTIGEN VACCINE.
Semi-annual contract progress rept., 1 Mar-1 Sep 66,
Parke, Davis and Co., Detroit, Mich.
Frank B. Brandon. 1 Sep 66, 52p
Contract PH-43-66-37

Descriptors: (*Parainfluenza virus, *Vaccines), Antigens + antibodies, Agglutinins, Preparation, Immunity, Growth, Stability, Electron microscopy, Laboratory animals, Tissue culture, Feasibility studies.

Master seeds for parainfluenza types 1, 2 and 3 were prepared. The seed for types 1 and 2 completed all appropriate tests for safety and purity. The seed for type 3 virus is on test. It is assumed that the hemagglutinating activity of preparations containing intact virus is proportional to the virus concentration and hence to animal immunogenicity. Thus, hemagglutinating activity was used to monitor growth, concentration and stability studies of intact virus preparations. A standard procedure was developed (including multiple harvests) for the growth of parainfluenza type 1 virus, and a number of lots of crude virus prepared. Sharples centrifugation appears to be a satisfactory pro-

cedure for routine concentration of the virus. Concentrated virus was used for extraction and stability studies. Physical and biological characterization of the intact virus and the isolated antigen was started, including a preliminary rate zonal run in the B-IV rotor which suggests pleomorphism of the intact virus. Several mild extraction procedures reproducibly increase the hemagglutination titer, although the antigens so derived are not identical. Two major problems are (1) the relative instability of intact virus and ether-isolated hemagglutinins and (2) the continuing lack of a suitable common laboratory animal for conducting routine screening tests. (Author)
PB-173 691 HC$3.00 MF$0.65

6O. PHARMACOLOGY

A SURVEY OF SOME DICOTYLEDONOUS PLANTS; BIOASSAY AND CHEMICAL ANALYSIS.
Edgewood Arsenal Md
For primary bibliographic entry see Field 6C.
AD-652 880 HC$3.00 MF$0.65

EFFECTS OF CORTISOL RELEASED CUTANEOUS PROTEASE UPON THE PERMEABILITY OF THE MICRO-CIRCULATION,
Children'S Hospital Washington D C Biochemical Research Lab
For primary bibliographic entry see Field 6A.
AD-653 230 Not available from CFSTI.

SYNTHESIS AND CHEMICAL REACTIONS OF SOME CONJUGATED HETEROENOID COMPOUNDS.
Suffield Experimental Station Ralston (Alberta)
For primary bibliographic entry see Field 7C.
AD-653 398 Not available from CFSTI.

PROBLEMS IN PHARMACOLOGY IN SPACE MEDICINE.
Problema Farmakologii V Kosmicheskoy Meditsine
National Aeronautics and Space Administration, Washington, D. C.
V. YE.Belay, G. D. Glod, and P. V. Vasilyev.
Nov 66, 16p NASA-TT-F-10410
Transl. Into English From Russian Presented At the 17th Intern. Astronautical Cong., Madrid, 9-15 Oct. 1966

Descriptors: *Aerospace medicine, *Disease, *Drug, *Radiation sickness, *Space flight, Adaptation, Aerospace, Fatigue, Flight, Mechanism, Medicine, Neurology, Psychology, Radiation, Sickness, Space, Stimulation, Tension, Therapy, Treatment.

For abstract, see STAR 05 14.
N67-26632 HC$3.00 MF$0.65

ACUTE TOXICITY OF NSC 71795.
Research rept.,
South Shore Analytical and Research Lab., Inc., Islip, N. Y.
Nathan Rakieten, David A. Cooney, and Ruth D. Davis. 8 May 67, 15p
Contract PH-43-64-932

Descriptors: (*Cancer, Chemotherapeutic agents), (*Chemotherapeutic agents, Toxicity), Parenteral infusions, Mice, Mortality rates, Body weight, Diarrhea, Convulsive disorders, Toxic tolerances, Histology, Pharmacology, Dosage.
Identifiers: Pyrido carbazole dimethyl ellipticine.

The LD50 of NSC 71795, 6H-Pyrido (4,3-b)carbazole, 5,11-dimethyl-Ellipticine was determined following I.V. and P.O. administration in mice. The compound was made up in a vehicle consisting of 0.85% lactic acid in saline. The LD50 following I.V. administration was 22.4 mg/kg (67.2 mg/sqM) for male mice and 19.5 mg/kg (62.4 mg/sM) for female mice. All deaths were acute and were due to respiratory failure. The LD50 following oral administration was 178 mg/kg (534 mg/sqM) in males and 204 mg/kg (612 mg/sM) in females. Deaths were delayed and were preceded by weight loss, diarrhea and convulsions. Death probably was due to respiratory failure. The solution used for I.V. administration (2 mg/cc in 0.85% lactic acid in saline) appeared stable for 10 days, when refrigerated, by its lethality when administered I.V. to mice. The compound was also administered I.P. in Steroid Suspending Vehicle in a few range finding tests; it's toxicity was in the region of 1,000 mg/kg (3,400 mg/sqM). However, post mortem examination of animals sacrificed at the end of the 14 day period indicated the presence of unabsorbed drug, or at least material present on the surface of the liver, diaphragm and peritoneal surfaces. (Author)
PB-174 743 HC$3.00 MF$0.65

6P. PHYSIOLOGY

PHYSIOLOGICAL TOLERANCE STUDY OF CHIMPANZEES BREATHING 100 PERCENT OXYGEN AT 5 p.s.i.
Interim technical rept., 1961-1962,
Aeromedical Research Lab. (6571st), Holloman AFB, N. Mex.
Thomas L. Gleason, III, and Robert H. Edwards.
Sep 65, 61p 6571-ARL-TR-65-16

Descriptors: (*Oxygen consumption, *Toxic tolerances), Pressure breathing, Chimpanzees, Controlled atmospheres, Psychomotor tests, Blood analysis, Heart, Pulse rate, Stress (Physiology), Toxicity, Humidity, Instrumentation, Respiration, Biochemistry, Body weight, Dehydration, Statistical data, Temperature, Skin.

Three restrained, immature chimpanzees were subjected to a simulated pre-launch 100 percent oxygen environment at 14.7 p.s.i.a. for 15 hours and 15 minutes and an orbital period of 5 p.s.i.a. for 81 hours and 45 minutes. These animals also served as subjects for the same period of time in a 20 percent oxygen environment at sea-level pressure. One additional subject was tested in a 20 percent oxygen environment but failed to be tested in the 100 percent oxygen environment. Only two animals successfully completed both the 100 percent oxygen test and the 20 percent oxygen control test. During these periods the subjects were isolated in a chamber and performed psychomotor tasks at regular intervals in both the experimental and control environments. Heart rate, respiratory rate, and medial thigh skin temperatures were monitored and recorded during these experiments. Clinical examinations and iematological and serum biochemical determinations were performed before and following each test. The only significant findings were a marked bradycardia and a reduced respiratory rate observed during exposure to the 100 percent oxygen environment.
AD-471 457 HC$3.00 MF$0.65

PITCH OF A PERIODICALLY INTERRUPTED TONE,
Ohio State Univ Research Foundation Columbus
For primary bibliographic entry see Field 5J.
AD-652 784 Not available from CFSTI.

CORRELATION ANALYSIS OF EEG-TREMOR RELATIONSHIPS IN MAN,
Massachusetts Inst of Tech Cambridge Research Lab of Electronics
J. S. Barlow. 1967, 11p
Contract DA-36-039-AMC-03200 (E), Grant NsG-496
Prepared in cooperation with Massachusetts General Hospital, Boston.
Availability: Published in Recent Advances in Clinical Neurophysiology. Electroenceph. Clin. Neurophysiology Supp125 p167-77 1967.

Descriptors: (*Electroencephalography, Correlation techniques), Extremities, Electrophysiology, Vibration, Nervous system diseases.
Identifiers: Tremors.

Relationships between EEG and rhythmical tremor of the outstretched upper extremities have been explored for two normal controls and for two patients, one of whom having a rather rhythmical physiological tremor bilaterally, and the other having a pronounced rhythmical tremor unilaterally, there being a family history of familial tremor in both cases. Tremors, monitored by means of accelerometers, were recorded simultaneously with the EEGs onto magnetic tape. Photic stimulation with flash rates in the alpha frequency range were included in some of the recordings. The magnetic tape recordings were analyzed by autocorrelation and crosscorrelation, techniques that are particularly suitable for exploring EEG-tremor relationships. Results from the two normal controls yielded no evidence of correlation between physiological tremor and the parieto-occipital EEG, even at levels that would have escaped detection upon simple visual inspection of the unanalyzed inked traces. Some suggestive evidence of correlation between tremor and parieto-occipital EEG rhythms, which was not clearly ascribable either to short-time correlation errors or to movement artifact, was obtained from analyses of the recordings from the patients. Photic stimulation with flash rates in the alpha frequency range was without effect upon the frequency characteristics of the tremors in those instances in which it was carried out. (Author)
AD-652 898 Not available from CFSTI.

SINGLE FIBERS OF CAT OPTIC NERVE: 'THRESHOLDS TO LIGHT',
Massachusetts Inst of Tech Cambridge Research Lab of Electronics
David C. Milne, and Wolf-Dieter Heiss. 24 Jan 67, 2p
Contract DA-36-039-AMC-03200 (E), Grant NsG-496
Prepared in cooperation with Vienna Univ. (Austria). Dept. of General and Comparative Physiology.
Availability: Published in Science v155 n3769 p1571-2 Mar 24 1967.

Descriptors: (*Optic nerve, Thresholds (Physiology)), Electrophysiology, Responses, Psychophysics, Nerve cells, Cats.

Absolute thresholds of 39 single fibers of the optic nerves of 20 cats were determined by inspection of post-stimulus time histograms, each computed from the responses to 60 to 100 identical flashes of white light. The values found--from 1.1 x 10 to the minus 7th power to 6.8 x 10 to the minus 6th power candella per square meter (nits)--agree well with psychophysical thresholds found in previous investigations. (Author)
AD-652 909 Not available from CFSTI.

BREATHING UNDER HIGH AMBIENT PRESSURE,
Naval Submarine Medical Center Groton Conn Medical Research Lab
George P. Lord, George F. Bond, and Karl E. Schaefer. 19 Jul 65, 10p Rept no. SMRL-491 NAVMED-MR005.04-0063.01
Availability: Published in Journal of Applied Physiology v21 n6 p1833-8 Nov 1966.

Descriptors: (*Pressure breathing, *Acclimatization), Helium, Lungs, Physiology, Respiration.

The acute effect of high ambient pressure on expiratory airflow was studied in healthy, adult males in the ambient pressure range from 1.0 to 7.0 atmospheres absolute pressure (Ata), using a hyper-

baric chamber. Changes in flow were assessed with the maximum expiratory flow-volume curve. The decrease in flow was compared to that occurring in dense high molecular weight gas mixtures. In addition, expiratory gas flow was studied in three men during 12 days at 7.0 Ata in 90% helium. The findings demonstrate that: (1) High ambient pressure and high molecular weight gas of equal density produce similar changes in expiratory flow; (2) In the pressure range from 1.0 to 4.0 Ata in air, the greatest decrease in maximum expiratory flow occurs at high lung volumes, while from 4.0 to 7.0 Ata the greatest flow change occurs at low lung volumes; (3) The long-term changes in expiratory flow in high-pressure helium can be explained by the change in physical properties of the breathing mixture; and (4) There are no clinically apparent untoward effects from prolonged high-pressure helium breathing. (Author)

AD-652 937 Not available from CFSTI.

WHOLE ORGAN FREEZING AND THAWING HEAT TRANSFER AND THERMAL PROPERTIES.

Geoscience Ltd La Jolla Calif

For primary bibliographic entry see Field 6E.

AD-653 101 HC$3.00 MF$0.65

STIMULUS-ORIENTED APPROACH TO DETECTION RE-EXAMINED,

Texas Univ Austin Defense Research Lab

For primary bibliographic entry see Field 20A.

AD-653 123 Not available from CFSTI.

PERFORMANCE OF SMALL MAMMALS AT LOW BODY TEMPERATURES.

Georgetown Univ Washington D C Dept of Biology

For primary bibliographic entry see Field 6C.

AD-653 127 HC$3.00 MF$0.65

HORIZONTAL VISUAL RANGE IN POLAR WHITEOUT.

Special rept.,

Main Univ (West Germany) Meteorologisch-Geophysikalisches Institut

Fritz Kasten, May 62, 10p

CRREL-SR-54

Contracts DA-91-508-EUC-380, DA-91-591-EUC-1300

Descriptors: (*Vision, Polar regions), Snow, Visibility, Visual perception, Illumination, Colors, Albedo, Thresholds (Physiology), Eye, Meteorology, Optical properties, Permafrost, West Germany.

Identifiers: Whiteout.

A theory on the horizontal visual range of objects of any color under overcast sky and over homogeneous ground is briefly outlined. The theory takes into account the influence of the visual ground albedo on the illumination of the object and the dependence of the contrast threshold of the human eye on the visual angle subtended by the object viewed. The object always appears darker than the horizon. The visual range of a black object is greater than that of any brighter object and is independent of the visual ground albedo. The visual range of objects of low or medium visual albedo is also almost independent of the visual ground albedo so that they may be considered as equivalent to black objects. But the visual range of white objects strongly depends on the visual ground albedo; it tends to zero when the visual ground albedo is greater than 0.94 even in clear air. The effect of the visual angle and hence of the diameter of the object on its visual range becomes marked only for visual angles smaller than 0.2 degrees. The results explain the optical conditions encountered in polar whiteout. Measurements made in whiteouts in North Greenland proved the validity of the theory. (Author)

AD-653 149 HC$3.00 MF$0.65

THERMAL AND METABOLIC RESPONSES TO COLD OF PERUVIAN INDIANS NATIVE TO HIGH ALTITUDE,

Instituto de Biologia Andina Lima (Peru)

Robert W. Elsner, and Atle Bolstad. Jun 63, 30p

AAL-TDR-62-64, N63-21408

Contract AF 41 (657)-249

Descriptors: (*Acclimatization, *Heat production (Biology)), Body temperature, Metabolism, High altitude, Anthropology, Local anesthetics, Exposure, Tolerances (Physiology), Adaptation (Physiology), Peru.

Identifiers: Cold tolerance.

Thermal and metabolic responses of eight male Peruvian Indians native to an altitude of 4000 to 4500 meters were studied during nightlong exposures to moderate outdoor cold (2 to 5C). In addition, four of the subjects were studied during cold exposure while chewing coca leaves, alleged by them to have protective effects during cold exposure. The metabolic rate of the eight subjects was elevated during cold exposure but did not differ significantly from averaged values for 17 Caucasian control subjects studied under similar conditions in previous experiments. Differences between the thermal responses of the Indian subjects and of the same Caucasian controls were noted in the generally higher hand and foot temperatures, and the correspondingly lower rectal temperatures, of the high altitude dwellers. The Indian subjects using coca did not display any measurable differences in their responses with or without the drug but, by observation and by their own report, they did sleep longer and more comfortably when using coca. (Author)

AD-653 192 HC$3.00 MF$0.65

RELATIONSHIP BETWEEN FUNCTION AND METABOLIC ACTIVITY OF HEART IN SITES.

Final rept.,

Albert Einstein Medical Center Philadelphia Pa

Clem Russ, 1967, 17p

Contract AF 41 (609)-3137

Descriptors: (*Hypothermia, Heart), (*Heart, Metabolism), Cooling, Hypoxia, Glycolysis, Oxygen consumption, Fatty acids, Oxidation, Adenosine phosphates, Glucose, Lactates, Pyruvates, Reviews.

The results of the studies indicate that oxidative processes of the hypothermic myocardium shifts toward utilization exclusively of non-esterified fatty acids after 24 hours. This shift in metabolism appears to be associated with a rise in myocardial internal efficiency and a fall in external efficiency. These changes represent what might be considered a disturbance in energy production. Energy production in heart muscle as well as skeletal muscle involves the oxidation of food stuff to carbon dioxide and water. The primary substrates, glucose, lactate, pyruvate and non-esterified fatty acids are passed through a series of intermediary reactions during which energy is liberated and subsequently utilized to perform mechanical work. This energy is derived through the oxidation processes within the Krebs' Cycle or tricarboxylic acid cycle, the final common pathways for oxidation of all food stuffs. (Author)

AD-653 221 HC$3.00 MF$0.65

ABSORPTION AND ELECTROLYTE CHANGES OF INTESTINAL MUCOSA FOLLOWING SUBSTRATE INDUCTION,

Miami Univ Coral Gables Fla Dept of Physiology

Arthur S. Nunn, Jr., and Martha S. Ellert. 23 Jun 66, 6p

Contract DA-49-193-MD-2415

Availability: Published in American Journal of Physiology v212 n3 p711-16 Mar 1967.

Descriptors: (*Intestines, Absorption (Biological)), (*Electrolytes (Physiology), Absorption (Biological)), (*Glucose, *Absorption (Biological)), Transport properties, Mucus, Membranes (Biology), Semipermeability, Sodium, Potassium, Magnesium, Calcium, Phosphoric monoester hydrolases.

Increased absorption and transport of glucose by the ileum of rat intestine was studied following glucose feeding. Similar feeding procedures using poorly absorbed and nonactively transported sorbose did not increase absorption or transport of glucose in the same intestinal areas. Alterations of mucosal electrolytes, particularly potassium, magnesium, and calcium that were observed following glucose induction were not evident following sorbose feeding. Mucosal sodium was unchanged by either feeding procedure. Assuming sodium pump involvement in the transport process, glucose induction may result in stimulation of the sodium pump. This condition of sodium uptake and subsequent extrusion could result in the mucosal sodium concentration remaining relatively constant. Nonspecific phosphatase activity in the lower intestine was unchanged following induction. In agreement with previous findings this would indicate a lack of dependency between glucose transport and nonspecific phosphatase activity. (Author)

AD-653 241 Not available from CFSTI.

SPEECH RESEARCH.

Haskins Labs New York

For primary bibliographic entry see Field 17B.

AD-653 373 HC$3.00 MF$0.65

THE ELECTRORETINOGRAPHIC RESPONSE TO WEAK STIMULI OF LARGE SUBTENSE II.

Institute for Perception RVO-TNO, Soesterberg (Netherlands).

P. Padmos, and N. M. Schweitzer. 1966, 27p

IZF-1967-5, TDCK-47865

Descriptors: *Dark adaption, *Electroretinogram, *Retina, *Visual stimulus, Adaptation, Dark, Eye, Light, Physiology, Response, Stimulus, Visual.

For abstract, see STAR 05 14.

N67-27698 HC$3.00 MF$0.65

INFORMATION PROCESSING IN THE FUNCTIONAL VISUAL FIELD.

Institute for Perception RVO-TNO, Soerterberg (Netherlands).

For primary bibliographic entry see Field 5J.

For abstract, see STAR 05 14.

N67-27773 HC$3.00 MF$0.65

EFFECTIVENESS OF THREE VISUAL CUES IN THE DETECTION OF RATE OF CLOSURE AT NIGHT,

BioTechnology, Inc., Arlington, Va.

For primary bibliographic entry see Field 13F.

PB-174 794 HC$3.00 MF$0.65

6R. RADIOBIOLOGY

A METHOD FOR IMPROVING ACCURACY OF AIR PARTICULATE ACTIVITY MEASUREMENTS,

Naval Medical Research Lab., New London, Conn.

Clement H. Darby, Jr. 4 Oct 62, 20p Rept. no. 387, Vol.21/No. 18

NAVMED-MR005.14-3002-4.07

Descriptors: (*Whole body irradiation, Submarine personnel), (*Air pollution, Nuclear powered vessels), Sampling, Submarines, Radioactivity, Gamma rays, Beta particles.

In order to investigate the air particulate radioactivity in nuclear-powered submarines more pre-

cisely than has been done heretofore, four members of the Blue Crew of a nuclear-powered submarine, the USS ROBERT E. LEE SSB (N)-601, were subjected to whole-body gamma radiation tests before they had any known contact with radioactivity or nuclear reactors. They were similarly tested after participating in a 60-day patrol. Preliminary analysis of the two sets of data indicates the absence of any internally-deposited radionuclides. It thus appears that air particulate activity at its present levels and under normal operating conditions is well within perscribed conservative limits against external and internal beta radiation. More complete conclusions will be possible after computer analysis of the data. (Author)
AD-401 763 HC$3.00

MODIFICATION BY HEXITOLS AND SUGARS OF CHANGES INDUCED IN YEAST BY STARVATION. II. CELLULAR DEPLETIONS AND SUGAR BINDING.
Army Medical Research Lab Fort Knox Ky
For primary bibliographic entry see Field 6A.
AD-652 704 HC$3.00 MF$0.65

LASER HAZARDS BIBLIOGRAPHY, APRIL 1967,
Army Environmental Hygiene Agency Edgewood Arsenal Md
David H. Sliney, and William A. Palmisano. 20 Apr 67, 25p

Descriptors: (*Lasers, Hazards), Bibliographies, Medical research, Skin, Eye, Safety devices, Protection, Coherent radiation, Attenuation, Pathology, Radiation hazards, Industrial medicine.

The bibliography provides a source of references for those interested in the biological effects and the evaluation of hazards associated with laser equipment. The references are categorized into six principal sections: General Information; Biological Effects - General Research; Skin Effects; Eye Effects; Safety and Protective Equipment and Procedures; and Atmospheric Attenuation of Laser Beams.
AD-652 707 HC$3.00 MF$0.65

MICROWAVE HAZARDS BIBLIOGRAPHY, APRIL 1967,
Army Environmental Hygiene Agency Edgewood Arsenal Md
David H. Sliney, and William A. Palmisano. 20 Apr 67, 40p

Descriptors: (*Microwaves, Hazards), Bibliographies, Medical research, Eye, Industrial medicine, Instrumentation, Measurement, Microwave equipment, Radiation hazards, Pathology.

The bibliography provides a source of references for those interested in the biological effects and the evaluation of hazards associated with microwave generating equipment. The references are categorized into four principal sections: Biological Effects; Ocular Effects; Occupational Health Aspects; and Instrumentation, Measurements, and Technical Evaluation of Microwave Equipment.
AD-652 708 HC$3.00 MF$0.65

RADIATION-INDUCED LEUKEMIA IN GERMFREE RODENTS,
Notre Dame Univ Ind Lobund Lab
For primary bibliographic entry see Field 6C.
AD-652 785 Not available from CFSTI.

RADIATION PATHOLOGY IN GERMFREE MICE AND BONE MARROW TRANSPLANTATION IN IRRADIATED GERMFREE MICE,
Notre Dame Univ Ind Lobund Lab
Raphael Wilson, and Patricia M. Bealmear. 1966, 9p
Grants PHS-RH-00239-01, PHS-RH-00239-02
Availability: Published in The Proc. Intern. Conf. Radiation Biology and Cancer p107-15 1966.

Descriptors: (*Radiation effects, *Germ-free animals), (*Bone marrow, Transplantation), X rays, Radiological dosage, Hemopoietic system, Whole body irradiation, Hematology, Pathology, Infectious diseases, Radiobiology, Radiation sickness, Responses.

The cause of death following acute whole-body irradiation is dose related: at the lower end of the lethal range, it is considered to result from infection; at high doses, hematopoietic failure, at still higher levels (1,000-10,000 R), intestinal damage; and above 10,000 R central nervous system damage. The elimination of post-irradiation infection was seen early as a means of increasing survival at the lower doses, but it was not apparent what, if any, role microorganisms played in the radiation pathology at high dose levels. Germfree animals have become very important in assessing the effect of microorganisms on the response of mammals to whole-body ionizing radiation, the recovery phenomena, bone marrow therapy, and the action of protective agents. Reported are major results of radiation pathology studies and bone marrow treatment studies performed with germfree mice. (Author)
AD-652 787 Not available from CFSTI.

THE EFFECTS OF LASER IRRADIATION ON THE CENTRAL NERVOUS SYSTEM. I. PRELIMINARY STUDIES,
Armed Forces Inst of Pathology Washington DC
June R. Hayes, John L. Fox, and Marvin N. Stein. 1967, 10p
Prepared for presentation in part at the Laser Medical Research Foundation Meeting (1st), Boston Jun 3 17-18 1965, and the International Congress of Neurological Surgery (3rd), Copenhagen, August 22-7 1965. Prepared in cooperation with George Washington Univ., Washington, D. C. School of Medicine, and Veterans Administration Hospital.
Availability: Published in Journal of Neuropathology and Experimental Neurology v26 n2 p250-8 Apr 1967.

Descriptors: (*Lasers, *Central nervous system), Brain, Radiation effects, Mortality rates, Mice, Pathology, Radiation hazards, Histology, Tracer studies, Permeability, Gas chromatography.

The study explored the effects of focused laser radiation on the brains of mice, rats, and guinea pigs, both with and without craniectomy. The removal of the intervening skull bone increased the amount of energy absorbed by the brain, but markedly decreased the mortality rate. At sufficient energies, one pulse train of laser light focused on the exposed intact skull caused fracture of the skull and herniation of the brain through suture lines. Respiration ceased immediately, and cardiac contractions stopped in 12 to 15 minutes. Coagulation, necrosis, and hemorrhage surrounded by edema was seen microscopically at the site of the laser irradiation. Examination of the blood-brain barrier with a fluorescein tracer revealed injury at the point of laser impact and also along the basal structures of the brain and brain stem when the skull bone was not removed. This indicated caudal herniation of the temporal lobe and brain stem. Maximum damage occurred if the focal point of the beam was on the surface of the skull. High-speed cinematography verified the occurrence of explosive pressure changes as the laser energy was absorbed within the cranial cavity. Gas bubbles produced by laser irradiation contained oxygen, nitrogen, and lighter gases of an undertermined nature. It is concluded that the use of laser energy to therapy should be approached with caution because of physical and biologic factors. (Author)
AD-652 792 Not available from CFSTI.

THE PREPARATION OF SIMPLIFIED MANUALS FOR SHIELDING ANALYSIS.
Interim rept.,
Conesco Watertown Mass
John F. Batter, and Albert W. Starbird. Mar 67, 107p Rept no. 4848-1
Contract OCD-PS-65-67
See also AD-652 874.

Descriptors: (*Shielding, *Structures), (*Radioactive fallout, *Instruction manuals), Radioactive fallout, Gamma rays, Underground structures, Scattering, Theory, Contamination, Mathematical analysis, Structural parts, Training devices, Tables, Data.

Calculational methods currently used to predict shelter from radiological fallout are examined with respect to both experimental and analytical data such that simplified methods could be developed. Emphasis is placed upon 'In and Down Scattering', the effects of finite fields of contamination and how interior partitions affect the dose rate in above and below-ground areas. The discrepancy found between calculation and experiment for in and down scattering is attributed primarily to the attenuation afforded by the basement ceiling. A preliminary analytical estimate of this attenuation, based upon Compton single scattering, is presented and a modified calculational technique suggested for use in shelter calculations. Little full-scale theoretical and experimental data on the dose contributed by limited strips of contamination exists at the current time. Fair agreement exists between values computed by the engineering method of shelter calculation and experiments on scale models. The simplified calculational technique at times creates values that differ from the more complex techniques. A modified simplified technique is suggested that provides significantly better agreement. The existing methods of computing the effects of interior partitions in above-ground areas shows good agreement with what few experiments that are currently available. There is a strong indication, though that the dose attributed to the radiation scattered in the walls of the structure is underestimated. (Author)
AD-652 873 HC$3.00 MF$0.65

THE PREPARATION OF SIMPLIFIED MANUALS FOR SHIELDING ANALYSIS. SUPPLEMENT I: 'IN AND DOWN' SCATTERING AND FINITE FIELDS OF CONTAMINATION.
Final rept.,
Conesco Watertown Mass
Albert W. Starbird, and John F. Batter. Mar 67, 79p Rept no. 4848-2-Suppl-1
Contract OCD-PS-65-67
See also AD-652 873.

Descriptors: (*Shielding, *Structures), (*Radiation effects, *Instruction manuals), Radioactive fallout, Gamma rays, Underground structures, Scattering, Theory, Contamination, Mathematical analysis, Structural parts, Training devices, Tables, Data.

A study was undertaken to examine present and proposed methods of calculating the attenuation afforded 'in and down' scattered radiation by a horizontal slab, and the effects of finite fields of contamination in order to recommend improvements and updating for OCD documents TR-20, Volumes 1 and 2, 'Shelter Design and Analysis.' In this study we examined the assumptions used in computing the 'in and down' attenuation factor, assessed their effect on the resulting attenuation factors, and compared the results with the latest available experimental data. Recommendations are provided as to 'best value' factors and how they might be included in existing publications. The effects of finite fields of contamination were subjected to further analysis by directly comparing the existing method of calculation with results obtained using transmission coefficients calculated by the Monte Carlo method. This comparison, though complete only for above-ground locations,

indicates that further study is required before the existing method of calculation can be relied upon. (Author)
AD-652 874 HC$3.00 MF$0.65

LATE HISTOPATHOLOGICAL CHANGES IN KIDNEYS OF GRID-IRRADIATED MICE,
Walter Reed Army Inst of Research Washington D C
Thomas J. Bucci, Mary M. McLaughlin, Charles N. Conant, Adolph T. Krebs, and Kent T. Woodward. 1966, 10p
Availability: Publised in Strahlentherapie v131 n3 p352-60 1966.

Descriptors: (*Radiotherapy, Shielding), (*Kidneys, Radiation effects), Histology, Pathology, Aging (Physiology), Radiological dosage, x rays, Mice.
Identifiers: Grid shielding.

Mice irradiated with high doses (1100, 2000, and 3000 R) of X-ray through lead grids were observed for many months following exposure. Animals were examined at intervals for gross and microscopic changes. Grid-shielded mice maintained their healthy appearance throughout the experiment. Grid patterns of epilation appeared in the fur within a few weeks, but the earliest gross evidence of an internal grid pattern was seen only after 11 months in kidneys of mice exposed to 3000 R. In animals exposed to lower doses this was delayed. Typical radiation nephropathy can be produced in focal areas corresponding to the grid pores. The intervening renal tissue of the same kidney is then available as control material. It is suggested that this technique may be of considerable value in separating changes due to aging from changes due to radiation in the kidney, and perhaps in other organs as well. (Author)
AD-652 941 Not available from CFSTI.

THE INFLUENCE OF WHOLE-BODY EXPOSURE TO X-RAYS OR NEUTRONS ON THE LIFE SPAN DISTRIBUTION OF TUMORS AMONG MALE RATS,
Naval Radiological Defense Lab San Francisco Calif
Toribio J. Castanera, Dave C. Jones, Donald J. Kimeldorf, and V. J. Rosen. 4 Apr 67, 60p Rept no. USNRDL-TR-67-36
NAVMED-MR005.08-0018

Descriptors: (*Whole body irradiation, *Neoplasms), Life span, Radiation effects, X rays, Neutrons, Cancer, Rats.

Adult male rats were irradiated with single, whole-body doses of x-rays (430 or 680 rads) or with neutrons (230 or 320 rads) and maintained in a duration of life study. An analysis of the extent of tumorigenesis was made according to the type of tumor, the number of animals with tumors and the distribution of tumors among organs for each dose group. Greater proportions of the irradiated groups developed greater numbers of tumors than did the controls, even though lifespan was reduced by irradiation. Radiation was particularly effective in inducing malignant tumors of epithelial origin although there were significant excesses of animals with malignant non-epithelial tumors and with benign tumors of both epithelial and non-epithelial origin. Among the numerous organs and tissues in which tumors developed, the skin, kidney, lung and islets of Langerhans appeared especially responsive to irradiation. Consistent relationships between incidences of animals with tumors and dose or quality of radiation were not apparent. (Author)
AD-653 063 HC$3.00 MF$0.65

RADIATION INDUCTION OF SKIN NEOPLASMS IN THE MALE RAT,
Naval Radiological Defense Lab San Francisco Calif
Dave C. Jones, Toribio J. Castanera, Donald J. Kimeldorf, and V. J. Rosen. 4 Apr 67, 34p Rept no. USNRDL-TR-67-37
NAVMED-MR005.08-0018

Descriptors: (*Radiation effects, Neoplasms), Skin, X rays, Aging (Physiology), Radiological dosage, Neutrons, Histology, Cancer, Rats.

Young adult male rats were irradiated with 430 or 680 rads of 250 kvp x-rays or with 230 or 320 rads of fast neutrons, and examined at frequent intervals throughout life for the presence of skin (cutaneous or subcutaneous) tumors. Growths were surgically removed and histologically identified. There were 370 primary tumors and 3 metastases found among the 438 animals examined. At least half of the animals in each of the four irradiated groups developed skin tumors, as compared with about a fifth of their nonirradiated littermate controls. Significantly more irradiated animals had more than one skin tumor. The median age at initial appearance of tumors was significantly less in irradiated animals, particularly when the tumors were benign. On an age-specific basis, excess incidences of animals with tumors in the irradiated groups were apparent within about 8 months of exposure, and the effect was especially related to the occurrence of malignant tumors of epithelial origin. Tumors were found in irradiated animals in areas of the skin in which they were absent in the controls. In both irradiated and control animals, tumors developed with no evidence of previous gross destruction and regeneration of skin tissues. No consistent relationships between the incidence of animals with tumors and the dose or type of radiation were apparent. (Author)
AD-653 064 HC$3.00 MF$0.65

AGEING STUDIES IN A MARSHALLESE POPULATION EXPOSED TO RADIOACTIVE FALL-OUT IN 1954,
Naval Medical Research Inst Bethesda Md
Robert A. Conard, Austin Lowrey, Maynard Eicher, Keith Thompson, and William A. Scott. 1966, 19p
NAVMED-MR-005.21.0004-1
Proceedings of a Colloquium held in Semmering (Austria), 23-24 Jun 66.
Availability: Published in Radiation nnd Ageing. Taylor and Francis, LTD, London p345-60 1966.

Descriptors: (*Radiation effects, *Aging (Physiology)), Radioactive fallout, Exposure, Thyroid gland, Children, Radioactive isotopes, Iodine, Gamma rays, Pathology, Adults, Analysis of variance, Correlation techniques, Neoplasms, Whole body irradiation, Population, Marshall Islands.

Late effects of radiation in a Marshall Island population accidentally exposed to radioactive fall-out in 1954 are reviewed. The most significant findings have been in regard to the development of thyroid abnormalities which have occurred largely in children exposeu at less than 10 years of age, and presumably caused by irradiation of the thyroid gland from internal absorption of radioiodines in the fall-out and gamma radiation. Possible radiation induced ageing effects were studied in 90 adults, 36 exposed and 55 unexposed by measurement of 14 criteria usually associated with ageing (skin elasticity and looseness, hair greyness; accommodation, visual acuity, and arcus senilis of the eyes; hearing loss; nervous and neuromuscular function and vibration sense, light extinction test, rapid movement test, and hand grip strength; systolic blood pressure, blood cholesterol level, and body potassium (40K)). Analysis of variance was used to determine correlation with age and the data for each criterion were weighted according to this correlation factor. Combined scores for all criteria gave a measure of 'physiological' age as compared with chronological age on an individual and group basis. Most of the criteria showed good correlation with age on a group basis, less so on an individual basis. Between 20 and 40 years of age the criteria showed less change than after that age. No significant differences were noted between the exposed and unexposed groups. It was postulated that if there were ageing effects from the dose of radiation received by this population more sensitive tests would be necessary to show them. (Author)
AD-653 236 Not available from CFSTI.

RADIOLOGICAL RECOVERY REQUIREMENTS, STRUCTURES AND OPERATIONS RESEARCH. VOLUME I: CALCULATIONAL TECHNIQUE FOR DETERMINING IMPORTANCE OF LIMITED STRIP DECONTAMINATION PROCEDURES.
Final rept.,
Research Triangle Inst Durham N C Operations Research and Economics Div
W. O. Doggett, and F. A. Bryan, Jr. May 67, 238p Rept no. R-OU-266-Final-Vol-1
USNRDL-TRC-67-2
Contract N00228-66-C-1086
See also AD-653 276 and AD-653 275, Vol 2.

Descriptors: (*Radiological contamination, Computer programs), Decontamination, Radioactive fallout, Dose rate, Protection, Operations research, Numerical analysis, Nuclear physics, Detectors, Attenuation, Shielding, Photons, Data, Theory.
Identifiers: CONSTRIP.

The document contains a description of the CONSTRIP III computer program. The program calculates the penetration of radiation from a uniformly contaminated horizontal rectangular source area through a shielding wall to a point detector. CONSTRIP III differs from its predecessor, CONSTRIP II, developed by the National Bureau of Standards, in three major respects: the detector may be located at the rear surface of the wall as viewed from the source, calculations may be performed for a zero wall thickness (no wall present), and an option to incorporate the build-up-air-attenuation factor for cobalt-60 on a concrete slab has been included. The method of summing contributions from source-patch--wall-slab combinations is the same in both programs. The program has been completely checked against hand calculations and the output has been compared with published experimental and theoretical results for several representative problems. The program is shown to be in good agreement with these other data and is believed to be an improvement over previous techniques for solution of the barrier shield problem. (Author)
AD-653 274 HC$3.00 MF$0.65

RADIOLOGICAL RECOVERY REQUIREMENTS, STRUCTURES AND OPERATIONS RESEARCH. VOLUME II: DAMAGED PF MULTIPLIER.
Final rept.,
Research Triangle Inst Durham N C Operations Research and Economics Div
T. Johnson. May 67, 56p Rept no. R-OU-266-Final-Vol-2
USNRDL-TRC-67-4
Contract N00228-66-C-1086
See also AD-653 276 and AD-653 274, Vol 1.

Descriptors: (*Radiological contamination, *Operations research), Decontamination, Radioactive fallout, Dose rate, Structures, Theory, Shielding, Computer programs, Nuclear physics, Detectors, Photons, Data, Regression analysis.
Identifiers: CONSTRIP.

The document contains the theoretical development and a demonstration of a damaged protection factor multiplier. A multiplier of the form e raised to the power (Beta sub 0 + Beta (sub 1)X (sub 1) + ... + Beta (sub n)X (sub n)) is prepared for multiplying the undamaged protection factor to obtain an estimate of the protection factor after structural damage. The X sub i represent such factors as loss of exterior wall mass, ingress of fallout, loss of interior partitions, etc. The variables selected offer

promise of explaining a large fraction of the change in protection factor caused by damage to a structure. Methods of testing the model are presented. (Author)
AD-653 275 HC$3.00 MF$0.65

RADIOLOGICAL RECOVERY REQUIREMENTS, STRUCTURES AND OPERATIONS RESEARCH: INTRODUCTION AND SUMMARY.
Final rept.,
Research Triangle Inst Durham N C Operationr Research and Economics Div
F. A. Bryan, Jr. May 67, 20p Rept no. R-OU-266-Final
Contract N00228-66-C-1086
See also AD-653 274, Vol 1 and ad-653 275, Vol 2. 2.

Descriptors: (*Radiological contamination, *Operations research), Decontamination, Radioactive fallout, Protection, Structures, Theory, Shielding, Computer programs, Detectors, Numerical analysis, Photons, Attenuation, Data.
Identifiers: CONSTRIP.

The document summarizes the research accomplished under OCD Subtask 3233B, Radiological Recovery Requirements, Structures and Operations Research. The primary objectives of this study are: to develop procedures which can be employed to estimate the effects of limited strips of contamination for the optimum direction of decontamination operations; and to develop a procedure for obtaining estimates of the protection factor available in damaged structures by means of a multiplicative function. The results of the research in these activities are summarized, and general and specific conclusions and recommendations are given. (Author)
AD-653 276 HC$3.00 MF$0.65

COMPARISON OF THEORETICAL OCEAN DIFFUSION MODELS,
Naval Radiological Defense Lab San Francisco Calif
D. R. Smith. 15 May 67, 32p Rept no. USNRDL-TR-67-50

Descriptors: (*Ocean models, *Mathematical analysis), Diffusion, Models (Simulations), Theory, Oceanology, Sea water, Radiological contamination, Equations, Radiological dosage, Equilibrium, Tests.

Since several diffusion equations exist for describing horizontal diffusion from a point-source release of material in the ocean, a comparison of these equations was made in order to determine the one which would give the most conservative answers for purposes of evaluation of radiological hazards. This comparison can be made in terms of the maximum spatial and temporal coordinates of a given concentration. In so doing it is found that these coordinates can be expressed in terms of the ratio of the initial concentration to the given concentration raised to some power. Equations were derived for the case of a continuous release and a similar analysis was made for the equilibrium situation. (Author)
AD-653 288 HC$3.00 MF$0.65

RADIOBIOLOGY, VOL. 6, NO. 2, 1966,
Division of Technical Information Extension (AEC), Oak Ridge, Tenn.
A. M. Kuzin, 1966, 251p
TT-67-61644
Trans. of Radiobiologiya (USSR) v6 n2 p161-336 1966.

Descriptors: (*Radiobiology, Biophysics), (*Radiological dosage, Nuclear radiation), Radiation effects, Physiology, Radiation sickness.

For abstract, see NSA 21 12.
AEC-TR-6771 HC$3.00 MF$0.65

1964 ENVIRONMENTAL MONITORING RADIATION LEVELS AT BROOKHAVEN NATIONAL LABORATORY,
Brookhaven National Lab., Upton, N. Y.
For primary bibliographic entry see Field 6F.
For abstract, see NSA 21 12.
BNL-50001 HC$3.00 MF$0.65

DOSIMETRY TECHNOLOGY STUDIES, 1965.
Battelle-Northwest, Richland, Wash. Pacific Northwest Lab.
Nov 66, 35p
Contract AT (45-1)-1830

Descriptors: (*Health physics instrumentation, *Radiological dosage), (*Dosimeters, *Radiation monitors), Radiation measurement systems, Iodine, Radioactive isotopes, Radioactive decay.

For abstract, see NSA 21 12.
BNWL-339 HC$3.00 MF$0.65

ENERGY AND ANGULAR DISTRIBUTION OF NEUTRONS AND GAMMA RAYS OPERATION BREN,
Oak Ridge National Lab., Tenn.
J. H. Thorngate, J. A. Auxier, and F. F. Haywood. Feb 67, 94p

Contract W-7405-eng-26

Descriptors: (*Neutron scattering, *Research reactors), (*Neutron detectors, *Gamma rays), (*Radioactive isotopes, *Cobalt), Radiation measurement systems.

For abstract, see NSA 21 12.
CEX-62.12 HC$3.00 MF$0.65

DETERMINATION OF URANIUM ALPHA ACTIVITY IN URINE,
Goodyear Atomic Corp., Piketon, Ohio.
R. E. Shoaf, H. L. Galloway, and L. R. Mullins, Jr. 1 Sep 66, 6p
Contract AT (33-2)-1

Descriptors: (*Urine, Chemical analysis), (*Alpha particles, Uranium).

For abstract, see NSA 21 03.
GAT-520 HC$3.00 MF$0.65

SPECTRAL ENERGY DISTRIBUTION OF UNFILTERED X-RAYS FROM A 250 KV CONSTANT POTENTIAL MACHINE,
Health and Safety Lab., New York Operations Office (AEC), N. Y.
Arthur Shambon. Aug 66, 22p

Descriptors: (*Radiological dosage, Dose rate), (*Dose rate, Ionization chambers).

For abstract, see NSA 20 24.
HASL-179 HC$3.00 MF$0.65

GUARANTEEING RADIATION SAFETY DURING THE VOSKHOD AND VOSKHOD-2 FLIGHTS.
Obespecheniye Radiatsionnoy Bezopasnosti Pri Poletakh Korabley "voskhod" I "voskhod-2"
National Aeronautics and Space Administration, Washington, D. C.
V. V. Antipov, B. I. Davydov, N. N. Dobrov, M. D. Nikitin, and YU. M. Volynkin. Nov 66, 6p
NASA-TT-F-10409
Transl. Into English of A Paper Presented At the 17th Intern. Astronautical Congr., Madrid, 9-15 Oct. 1966

Descriptors: *Radiation protection, *Space radiation, *Spacecrew, *Voskhod i spacecraft, *Voskhod ii spacecraft, Absorption, Dose, Experiment, Protection, Radiation, Safety, Space, Suit.

For abstract, see STAR 05 14.
N67-26561 HC$3.00 MF$0.65

SEMIANNUAL PROGRESS REPORT (ON AGRICULTURAL RESEARCH), JANUARY 1-JUNE 30, 1966.
UT-AEC Agricultural Research Lab., Oak Ridge, Tenn.
For primary bibliographic entry see Field 2-.
For abstract, see NSA 21 12.
ORO-653 HC$3.00 MF$0.65

RADIOISOTOPES IN THE BIOLOGICAL SCIENCES. AN ANNOTATED BIBLIOGRAPHY OF SELECTED LITERATURE,
Division of Technical Information Extension (AEC), Oak Ridge, Tenn.
Helen L. Ward. Apr 67, 120p

Descriptors: (*Radioactive isotopes, *Tracer studies), Radiobiology, Radiation effects, Bibliographies, Medical research, Ecology, Microbiology.

For abstract, see NSA 21 12.
TID-3585 HC$3.00 MF$0.65

SEMIANNUAL PROGRESS REPORT FOR THE PERIOD ENDING DECEMBER 31, 1966.
California Univ., Los Angeles. Lab. of Nuclear Medicine and Radiation Biology.
31 Dec 66, 105p
Contract AT (04-1)-GEN-12

Descriptors: (*Radiobiology, *Biochemistry), (*Radioactive isotoper, *Medical research).

For abstract, see NSA 21 12.
UCLA-12-612 HC$3.00 MF$0.65

PREDICTION OF THE MAXIMUM DOSAGE TO MAN FROM THE FALLOUT OF NUCLEAR DEVICES. I. ESTIMATION OF THE MAXIMUM CONTAMINATION OF AGRICULTURAL LAND,
California Univ., Livermore. Lawrence Radiat on Lab.
For primary bibliographic entry see Field 18H.
For abstract, see NSA 21 12.
UCRL-50163 pt. I HC$3.00 MF$0.65

6S. STRESS PHYSIOLOGY

INFLUENCE OF TIME ON TASK AND FALSE INFORMATION ON EFFICIENCY OF RESPONDING TO PURE TONES,
Army Medical Research Lab., Fort Knox, Ky.
For primary bibliographic entry see Field 5E.
AD-240 002 HC$3.00

PROLONGED EXPOSURE OF ANIMALS TO PRESSURIZED NORMAL AND SYNTHETIC ATMOSPHERES,
Naval Medical Research Lab., New London, Conn.
Robert D. Workman, George F. Bond, and Walter F. Mazzone. 26 Jan 62, 25p 374, Vol. 21/No. 5
NAVMED-MR005.14-3100-3.02

Descriptors: (*Pressure breathing, Tolerances (Physiology)), Decompression, Mammals, Survival, Laboratory animals, Helium, Oxygen, Pressure, Diving, Safety, Stress (Physiology).

Experimental animals (rats, guinea pigs and monkeys) were exposed to natural and synthetic atmospheres under conditions of pressure equivalent to 200 feet of sea water, for periods up to two weeks. Adequate decompression was then given these animals before their removal from the experi-

mental chamber. Results of the study confirm that survival of experimental animals in a selected atmosphere of helium and oxygen can be predicted. Although the animals could not survive a high pressure of air for more than 35 hours, an equivalent exposure to a selected synthetic breathing gas mixture was tolerated for a period of two weeks without deterioration. A second series of experiments was performed, using goats, to establish limits of adequate decompression for a completely saturated, equilibrated, large experimental animal. From the results of this series, it is believed that a safe decompression ratio can be established for gas-saturated human subjects. (Author)
AD-401 646 HC$3.00 MF$0.65

PHYSIOLOGICAL TOLERANCE STUDY OF CHIMPANZEES BREATHING 100 PERCENT OXYGEN AT 5 p.s.i.
Aeromedical Research Lab. (6571st), Holloman AFB, N. Mex.
For primary bibliographic entry see Field 6P.
AD-471 457 HC$3.00 MF$0.65

DEVELOPMENT OF AN INTEGRATED ERGOMETER/LOWER BODY NEGATIVE PRESSURE SYSTEM.
Final rept., Aug 65-Jun 66,
Lockheed Missiles and Space Co., Sunnyvale, Calif. Biotechnology.
F. E. Riley, C. C. Cain, and A. L. Weitzmann. 9 Dec 66, 41p
AMD-TR-66-4
Contract AF 41 (609)-2800

Descriptors: (*Weightlessness, Stress (Physiology)), (*Ergometers, Space flight), Exercise, Space environmental conditions, Space simulation chambers, Cardiovascular system, Laboratory equipment, Physical fitness, Design, Countermeasures.

The object of the program was to provide prototype equipment for use by the USAF in laboratory studies of physiological deconditioning similar to that which results from space flight. Three successive versions of an integrated Ergometer/Lower Body Negative Pressure (LBNP) System were delivered to AMD. The ergometer consists of a self-powered bicycle type unit with a solid-state electronic control system to maintain constant generator output regardless of pedal rotation speed. Recording capabilities are provided for a tachometer, and a wattmeter. Provisions are made to attach power consuming or power storage devices to the ergometer. Work loads up to one horsepower can be accommodated. The ergometer was calibrated using a dynamometer and speed reducer. The LBNP chamber is fully collapsible and employs circumferential rings to support the side loads. For ground applications longitudinal support members are used to carry the axial loads. The waist seal is a single molded unit and is removable from the chamber. The chamber has provisions for 19 leads of bioinstrumentation. A fail-safe overpressure control system is provided. A design limit of - 80 mm Hg for 15 minutes was demonstrated. Normal operating pressure is - 30 mm Hg. Provisions were made to integrate the ergometer with the LBNP. The two systems were designed to be operated individually, separately, or simultaneously, and in either the vertical or horizontal mode. Development needs were identified for future investigations. The major areas requiring further study are: generator design, weight reduction, material analysis, and flight version design. (Author)
AD-644 224 HC$3.00 MF$0.65

DEVELOPMENT OF A PULSED X-RAY TELEVISION FLUOROSCOPE FOR BIODYNAMIC RESEARCH.
Admiral Corp Chicago Ill
For primary bibliographic entry see Field 6L.
AD-652 851 HC$3.00 MF$0.65

NASA CONTRACT LISTINGS OF PUBLICATIONS UNDER THE BEHAVIORAL BIOLOGY PROGRAM.
George Washington Univ., Washington, D. C. Biological Sciences Communication Project.
F. Hong, L. A. Kulp, and S. Rollins. Feb 67, 52p NASA-CR-84161
Contract NSR-09-010-027

Descriptors: *Behavior, *Bibliography, *Biology, Animal, Environment, Gravity, Human, Nasa program, Neurology, Organism, Psychology, Space, Study.

For abstract, see STAR 05 14.
N67-26503 HC$3.00 MF$0.65

THE EFFECT OF PROLONGED ACCELERATION ON GAS EXCHANGE AND RESISTANCE OF RATS TO HYPOXIA.
National Aeronautics and Space Administration, Washington, D. C.
For primary bibliographic entry see Field 6C.
For abstract, see STAR 05 14.
N67-26573 HC$3.00 MF$0.65

FUNDAMENTALS OF HUMAN BIOMECHANICS IN AN UNSUPPORTED SITUATION.
Osnovy Biomekhaniki Cheloveka V Bezopornom Polozhenii
National Aeronautics and Space Administration, Washington, D. C.
V. I. Stephantsov, and A. V. Yeremin. Nov 66, 6p NASA-TT-F-10411
Transl. Into English of A Paper Presented At the 17th Intern. Astronautical Congr., Madrid, 9-15 Oct. 1966

Descriptors: *Biomechanics, *Space orientation, *Weightlessness, Arm, Human, Leg, Maneuverability, Movement, Orientation, Rotation, Space.

For abstract, see STAR 05 14.
N67-26574 HC$3.00 MF$0.65

THE TRANSFORMATION OF HUMAN METABOLIC PRODUCTS AND PRODUCTS OF A BIOLOGICAL COMPLEX DURING THE RECIRCULATION OF SUBSTANCES IN SMALL, CLOSED SPACES.
O Transformatsii Produktov Zhiznedeyatel'nosti Cheloveka I Biokompleksa Pri Osushchestvlenii Krugovorota Veshchestv V Malykh Zamknutykh Prostranstvakh
National Aeronautics and Space Administration, Washington, D. C.
A. L. Agre, S. V. Chizhov, B. G. Gusarov, YU. YESinyak, and V. I. Yazdovskiy. Nov 66, 9p NASA-TT-F-10405
Transl. Into English of A Paper Presented At the 17th Intern. Astronautical Congr., Madrid, 9-15 Oct. 1966

Descriptors: *Life support system, *Metabolic waste, *Waste utilization, Air, Closed, Food, Human, Life, Metabolism, Purification, Recirculation, Regeneration, Supply, Support, System, Transformation, Utilization, Waste, Water.

For abstract, see STAR 05 14.
N67-26576 HC$3.00 MF$0.65

CERTAIN PROBLEMS RESULTING FROM EFFECTS OF ACCELERATION DURING SPACE FLIGHT (EFFECTS OF CUMULATION AND ADAPTATION).
Nekotoryye Problemy Deystviya Peregruzok V Kosmicheskom Polete
National Aeronautics and Space Administration, Washington, D. C.
A. R. Kotovskaya. Nov 66, 19p NASA-TT-F-10412
Transl. Into English From Russian Presented At the 17th Intern. Astronautical Cong., Madrid, 9-15 Oct. 1966

Descriptors: *Acceleration stress, *Dog, *Monkey, Acceleration, Biochemistry, Damage, Flight, Heart, Hematology, Lung, Pathology, Physiology, Respiration, Roentgen, Space, Stress, Tolerance.

For abstract, see STAR 05 14.
N67-26624 HC$3.00 MF$0.65

AN INFORMATION MODEL OF THE EXTRAVEHICULAR DYNAMICS OF COSMONAUT BODY MOVEMENTS AND SPATIAL ORIENTATION.
National Aeronautics and Space Administration, Washington, D. C.
For primary bibliographic entry see Field 5H.
For abstract, see STAR 05 14.
N67-26626 HC$3.00 MF$0.65

AEROSPACE MEDICINE AND BIOLOGY - A CONTINUING BIBLIOGRAPHY WITH INDEXES.
National Aeronautics and Space Administration, Washington, D. C.
Apr 67, 78p NASA-SP-7011/36/

Descriptors: *Aerospace medicine, *Biological effect, Abstract, Aerospace, Bibliography, Biology, Effect, Environment, Exobiology, Flight, Index, Life, Medicine, Physiology, Psychology, Safety, Sanitation, Simulation, Space, Support, System, Toxicology.

For abstract, see STAR 05 14.
N67-27298 HC$3.00 MF$0.65

6T. TOXICOLOGY

TOXICOLOGY AND PATHOLOGY OF REPEATED DOSES OF MONOMETHYLHYDRAZINE IN MONKEYS.
Final rept., Apr-Jul 64,
Aerospace Medical Research Labs Wright-Patterson AFB Ohio
Kenneth C. Back, and Mildred K! Pinkerton. Feb 67, 20p Rept no. AMRL-TR-66-199

Descriptors: (*Methyl hydrazines, Toxicity), Pathology, Dosage, Blood chemistry, Biopsy, Toxic tolerances, Monkeys.

The effects of daily repeated doses of monomethylhydrazine (MMH) were studied in monkeys. Groups of monkeys were given from 2.5 to 5 mg/kg MMH i.p. for a total of 23 doses. Other monkeys were given from 7 to 10 mg/kg MMH i.p. for up to 4 days. Baseline and weekly clinical laboratory measurements studied were complete blood count, serum glucose, alkaline phosphatase, and glutamic oxaloacetic transaminase. At the end of the exposures, necropsies were performed on all animals. Special studies included fat stains of fresh cryostat sections of heart, liver, and luxol fast blue stains of pons, cerebellum, basal ganglia, and insular cortex. Results of the experiments have delineated the limits of toxicity for MMH in primates, as evaluated by clinical chemistry, symptomatology, and pathological examination. Repeated doses of 5 mg/kg cause emesis and some convulsions when a total of 15 mg/kg was reached. Animals tolerated daily doses of 2.5 mg/kg for a total of 23 injections with no significant effects. Other animals tolerated 12 doses of 5 mg/kg per day after having received 5 mg/kg each day for 3 days and 2.5 mg/kg for 8 days or 95 mg/kg for a 4-week period. This experiment tends to negate a tolerance phenomenon. The most significant conclusions from the experiments are the relative lack of pathological (either anatomical or clinical) alterations seen in the acute intoxications and the extremely narrow limits between a no-effect and lethal dose level. Of extreme interest is the absence of kidney

malfunction or renal pathology in these studies as contrasted by results seen in dogs at these dose levels. MMH causes marked renal damage in dogs. (Author)
AD-652 846 HC$3.00 MF$0.65

THIN FILM PERSONAL DOSIMETERS FOR DETECTING TOXIC PROPELLANTS.
Final rept., 15 Apr 64-15 Apr 65,
Magna Corp Redondo Beach Calif Research and Development Div
C. R. Townsend, G. A. Giarrusso, and H. P. Silverman. Feb 67, 71p Rept no. 6302-6001-R0000
AMRL-TR-66-231
Contract AF 33 (615)-1751

Descriptors: (*Gaseous rocket propellants, *Gas detectors), Metal films, Toxicity, Nitrogen oxides, Fluorine, Dimethyl hydrazine (1-1), Sensors, Resistance (Electrical), Silver, Copper, Gold, Films, Personnel, Protection, Portable.

The subject of this report is the development of a portable system for the detection of low concentrations of nitrogen tetroxide (N2O4), fluorine (F2), and unsymmetrical dimethylhydrazine (UDMH) in air. The detection system is based upon the change of electrical resistivity of thin metal films when exposed to these gases. Silver metal films coated with appropriate salts proved to be applicable to the detection of all three gases; however, the following sensitized metal films were found to be optimum: for N2O4, silver; for F2, copper; and for UDMH, gold. Using the best film and salt combinations found to date, N2O4 could be monitored over the range of 0.1 to 50 ppm, F2 over the range 1.0 to 50 ppm, and UDMH over the range 10 to 100 ppm, with a standard deviation of aeout 20 percent. The effects of temperature over the range 50 to 90C and of humidity from 10 to 90 percent on the response characteristics of the thin film sensors were found to be significant but within the tolerance limits. Means for reducing these effects were suggested which, if successful, would, in effect, make this detection system practically independent of changes in the environment. A portable breadboard readout instrument was designed and fabricated for use with the sensors to form an integrated detection system for personal protection. (Author)
AD-652 849 HC$3.00 MF$0.65

INHALATION TOXICITY OF PYROLYSIS PRODUCTS OF MONOBROMOMONOCHLOROMETHANE (CB) AND MONOBROMOTRIFLUOROMETHANE (CBrF3).
Aerojet-General Corp Dayton Ohio Toxic Hazard Research Unit
For primary bibliographic entry see Field 6T.
AD-652 850 HC$3.00 MF$0.65

INHALATION TOXICITY OF PYROLYSIS PRODUCTS OF MONOBROMOMONOCHLOROMETHANE (CB) AND MONOBROMOTRIFLUOROMETHANE (CBrF3).
Final rept., Sep 65-Jun 66,
Aerojet-General Corp Dayton Ohio Toxic Hazard Research Unit
Charles C. Haun, Edmond H. Vernot, J. D. MacEwen, David L. Geiger, and Robert P. Geckler. Mar 67, 34p Rept no. AGC-3320
AMRL-TR-66-240
Contract AF 33 (657)-11305
See also AD-635 577.

Descriptors: (*Fire extinguishers, Toxicity), (*Halogenated hydrocarbons, *Toxicity), Chlorine compounds, Bromine compounds, Methane, Pyrolysis, Industrial medicine, Rats, Toxic tolerances.

The toxicities of the pyrolysis products of two fire extinguishant compounds, CH2ClBr and CBrF3, were investigated using albino rats and 14 day LC50 values were determined for single 15-minute exposures. Both fire extinguisher compounds, currently used by the USAF for aircraft fires, were pyrolyzed at 800C in a hydrogen-oxygen flame. The pyrolysis products of each compound were examined and the principle constituents were identified and quantitated. The determined LC50 value of 2300 ppm for pyrolyzed CBrF3 produced a hydrogen fluoride concentration of 2480 ppm consistent with the reported LC50 value for a single 15-minute exposure to this gas. Monobromomonochloromethane pyrolysis products were found to have a LC50 of 465 ppm (as CH2ClBr) under the experimental parameters tested. The toxic response producing this LC50 value appeared to result from a mixture of hydrogen chloride, hydrogen bromide, and bromine gases. (Author)
AD-652 850 HC$3.00 MF$0.65

AN ECOLOGICAL STUDY ON THE EFFECTS OF CERTAIN CONCENTRATIONS OF CACODYLIC ACID ON SELECTED FAUNA AND FLORA.
Vitro Corp of America Eglin AFB Fla Vitro Services Div
For primary bibliographic entry see Field 6F.
AD-652 852 HC$3.00 MF$0.65

ACUTE TOXICITY OF NSC 71795.
South Shore Analytical and Research Lab., Inc., Islip, N. Y.
For primary bibliographic entry see Field 6O.
PB-174 743 HC$3.00 MF$0.65

6U. WEAPON EFFECTS

THE EFFECTS OF AMBIENT PRESSURE ON TOLERANCE OF MAMMALS TO AIR BLAST.
Technical progress rept.,
Lovelace Foundation for Medical Education and Research Albuquerque N Mex
Edward G. Damon, Charles S. Gaylord, William Hicks, John T. Yelverton, and Donald R. Richmond. Aug 66, 32p
DASA-1852
Contract DA-49-146-XZ-372

Descriptors: (*Blast, Tolerances (Physiology)), Shock waves, Pressure, Mammals, Wounds + injuries, Shock tubes, Pathology, Mortality rates, Weapons.

Seventy-six dogs, 43 goats, 211 rats and 255 guinea pigs were exposed to reflected shock pressures at ambient pressures ranging from 5 to 42 psia in air-driven shock tubes. Animal tolerance, expressed as LD50-one-hour overpressures rose progressively as the ambient pressure was increased. By analysis of the results of this study, combined with those from previous shock-tube investigations, a general equation for the regression of LD50 pressure on ambient pressure for mammals was derived. From this equation and previous estimates of the LD50 pressure for man's tolerance to overpressures of 400-msec duration at an ambient pressure of 12 psia, an equation relating LD50 pressure to ambient pressure was developed for the 70-kg mammal. (Author)
AD-652 892 HC$3.00 MF$0.65

BIOPHYSICAL MECHANISMS AND SCALING PROCEDURES APPLICABLE IN ASSESSING RESPONSES OF THE THORAX ENERGIZED BY AIR-BLAST OVERPRESSURES OR BY NON-PENETRATING MISSILES.
Lovelace Foundation for Medical Education and Research Albuquerque N Mex
I. G. Bowen, E. R. Fletcher, D. R. Richmond, F. G. Hirsch, and C. S. White. Nov 66, 50p
DASA-1857
Contract DA-49-146-XZ-372

Descriptors: (*Blast, Tolerances (Physiology)), (*Thorax, Blast), Mammals, Mathematical models, Wounds + injuries, Pressure, Shock waves, Lungs, Responses, Weapons.

A mathematical model was devised to study the dynamic response of the thorax of mammals to rapid changes in environmental pressure and to non-penetrating missiles impacting the rib cage near the mid-lateral point of the right or left thorax. Scaling procedures are presented for similar animals relating, for a given degree of damage, the body mass of the animal to various parameters describing the exposure 'dose'. Internal pressures computed with the model for a dog exposed at the end plate of a shock-tube are compared to those measured with a pressure transducer inserted in the esophagus down to the level of the heart. Computed time-displacement histories of missiles following impact with the right side of the thorax are compared to those obtained experimentally by means of high-speed motion picture photography. High internal pressures predicted with the model for non-penetrating impact are compared to those obtained experimentally and theoretically for exposure to air blast. Experimental data are presented arbitrarily assessing lung damage in animals struck by non-penetrating missiles (constant impact area) as a function of missile mass and impact velocity. These data are compared for several missile mass-velocity combinations with those computed using the mathematical model. Similarities in the dynamic responses of the thorax to air blast and to non-penetrating missiles are discussed. (Author)
AD-652 893 HC$3.00 MF$0.65

DASA-AEC-LOVELACE FOUNDATION BLAST-SIMULATION FACILITY,
Lovelace Foundation for Medical Education and Research Albuquerque N Mex
Donald R. Richmond, Charles S. Gaylord, Edward G. Damon, and R. V. Taborelli. Aug 66, 44p
DASA-1853
Contract DA-49-146-XZ-372
See also AD-652 892 and AD-293 872.

Descriptors: (*Blast, Tolerances (Physiology)), Test facilities, Shock waves, Shock tubes, Simulation, Instrumentation, Pressure, Specifications, Calibration, Shelters, Survival, Wounds + injuries.

The DASA-AEC-Lovelace Foundation Blast-Simulation Facility for the biomedical investigation of the effects of blast and shock is described in detail. Photographs, descriptions, and specifications of four air-driven shock tubes, ranging from 12 to 72 inches in diameter, and a concrete-pad, high-explosive test site are given. The instrumentation system and shock-tube and gauge-calibration procedures are included. Test parameters for each shock tube are briefly summarized and supported by typical pressure-time patterns and calibration curves. (Author)
AD-653 021 HC$3.00 MF$0.65

AIR-BLAST STUDIES WITH EIGHT SPECIES OF MAMMALS,
Lovelace Foundation for Medical Education and Research Albuquerque N Mex
Donald R. Richmond, Edward G. Damon, I. Gerald Bowen, E. Royce Fletcher, and Clayton S. White. Aug 66, 48p
DASA-1854
Contract DA-49-146-XZ-372
See also AD-653 021.

Descriptors: (*Blast, Tolerances (Physiology)), Mammals, Shock waves, Shock tubes, Wounds + injuries, Pressure, Thresholds (Physiology), Lungs, Pathology, Responses, Hemorrhage, Shelters, Survival, Simulation.

A series of three experiments were carried out. (1) A total of 204 dogs and 115 goats were exposed

to shock-tube and high-explosive-produced reflected shock waves ranging in duration from 400 to 1.5 msec. LD50 values, calculated by probit analysis, showed similar patterns for both species, increasing at the shorter durations by a factor of 4 or 5 above those for long durations. (2) Sixty dogs were exposed in a shock tube to 'sharp'-rising overpressures of near 400-msec duration at six-dose levels ranging from 9.2 to 35.8 psi. The degree of lung injury was graded and threshold for petechial hemorrhage determined. (3) Dose-response curves were compiled using data for 200 mice, 110 hamsters, 150 rats, 120 guinea pigs, 48 cats, and 40 rabbits exposed to 'long'-duration reflected pressures in a shock tube. The tolerances (LD50) for all six species are compared. Pathological observations for all species and lung-weight data for cats and hamsters are included. Criteria for relating biological response to the various parameters of the blast wave are discussed. (Author)
AD-653 022 HC$3.00 MF$0.65

THE TOLERANCE OF CATTLE TO 'LONG'-DURATION REFLECTED PRESSURES IN A SHOCK TUBE,
Lovelace Foundation for Medical Education and Resenrch Albuquerque N Mex
Edward G. Damon, Charles S. Gaylord, John T. Yelverton, and Donald R. Richmond. Aug 66, 33p
DASA-1855
Contract DA-49-146-XZ-372
See also AD-653 022.

Descriptors: (*Blast, Tolerances (Physiology)), Bovines, Shock waves, Shock tubes, Pressure, Wounds + injuries, Mortality rates, Pathology, Food.

Twenty-seven steers, mounted side-on against the endplate of an air-driven shock tube, were exposed to 'sharp'-rising reflected pressures of 184-msec duration. Pressure-time measurements were made with piezoelectric pressure transducers. Autopsies were performed on all animals and the nature of their blast injuries determined. The LD50 reflected pressure, obtained by probit analysis, was 43.1 psi for steers having a mean body weight of 180 kg. The results are compared with tolerance values obtained in previous investigations involving exposure of eight species of smaller animals to overpressures of 400-msec duration. Twenty-four hour, time-lethality data for steers are compared with those of five species of smaller animals. The potential use of blast-injured domestic animals, as a source of food, is briefly discussed. (Author)
AD-653 023 HC$3.00 MF$0.65

THE SCOPE OF BLAST AND SHOCK BIOLOGY AND PROBLEM AREAS IN RELATING PHYSICAL AND BIOLOGICAL PARAMETERS,
Lovelace Foundation for Medical Education and Research Albuquerque N Mex
Clayton S. White. Nov 66, 32p
DASA-1856
Contract DA-49-146-XZ-372
See also AD-653 023.

Descriptors: (*Blast, Tolerances (Physiology)), Pressure, Weapons, Responses, Shock waves, Hazards, Thresholds (Physiology), Survival, Wounds + injuries.

A few introductory remarks are followed by a brief discussion of the nature of hazards from air blast noting those due (a) directly to variations in pressure and (b) indirectly to the impact of penetrating and nonpenetrating, blast-energized missiles and the consequences of whole body displacement due to blast-induced winds or ground shock. The need for developing biomedical criteria based upon critical and measurable biological responses following exposure to significant and monitorable physical parameters is discussed in relation to hazards assessment. Also the multifaceted problem of tying up such information with blast-induced variations in the environment that occur free-field and under various conditions of exposure is noted and emphasized. (Author)
AD-653 024 HC$3.00 MF$0.65

EFFECTS OF OVERPRESSURE ON THE EAR: A REVIEW.
Technical progress rept.,
Lovelace Foundation for Medical Education and Research Albuquerque N Mex
Frederic G. Hirsch. Nov 66, 38p
DASA-1858
Contract DA-49-146-XZ-372

Descriptors: (*Blast, Tolerances (Physiology)), (*Ear, Wounds + injuries), Pressure, Anatomy, Physiology, Deafness, Thresholds (Physiology), Humans, Reviews.

Information regarding blast effects on the ear is reviewed in an attempt to gather quantitative information available for animals and man for help in the establishment of relationships between various levels of overpressure and the incidence of eardrum failure, the degree of damage to the middle and inner ear and other identifiable sequelae referable to cochlear or vestibular functions. (Author)
AD-653 129 HC$3.00 MF$0.65

THE RELATIONSHIP BETWEEN SELECTED BLAST-WAVE PARAMETERS AND THE RESPONSE OF MAMMALS EXPOSED TO AIR BLAST.
Technical progress rept.,
Lovelace Foundation for Medical Education and Research Albuquerque N Mex
Donald R. Richmond, Edward G. Damon, E. Royce Fletcher, I. Gerald Bowen, and Clayton S. White. Nov 66, 41p
DASA-1860
Contract DA-49-146-XZ-372

Descriptors: (*Blast, Tolerances (Physiology)), Mammals, Responses, Pressure, Time, Shock waves, Shock tubes, Wounds + injuries, Lungs, Ear, Mortality rates, Thresholds (Physiology), Hemorrhage, Pathology.

Shock tubes and high explosives were used to produce blast waves of various pressure-time patterns in order to study their biological effects. Data obtained from these experiments showed that, against a reflecting surface, the LD50 reflected pressure for any given species remained fairly constant at the 'longer' durations and then rose sharply at the 'shorter' times. For dogs and goats, 'long' durations were beyond 20 msec and for mice, rats, guinea pigs, and rabbits, beyond 1 to 3 msec. At the 'shorter' durations, response depended to a great extent on the impulse, and on peak pressure for the 'longer' pulses. Higher reflected pressures can be withstood if animals are locafed beyond a certain distance from the reflecting surface where they receive the incident and reflected pressures in two steps, separated by a given time-interval. In freestream exposures to air blast, orientation was significant. Animals suspended vertically or prone-side-on showed a lower tolerance to blast waves of a given intensity or at a given range than those end-on because the dynamic pressure appeared to add to their side-on pressure dose. Except for eardrum rupture and sinus hemorrhage, animals exhibited a remarkable tolerance to 'slow'-rising blast pressures without the presence of shock fronts. The lungs are considered the critical target organs in blast effects studies. (Author)
AD-653 131 HC$3.00 MF$0.65

7. CHEMISTRY

7A. CHEMICAL ENGINEERING

SIMPLIFICATION AND SYMMETRIZATION OF THE FIXMAN RELATION FOR VISCOSITY OF CRITICAL MIXTURES,
California Inst of Tech Pasadena Div of Chemistry and Chemical Engineering
For primary bibliographic entry see Field 7D.
AD-653 353 Not available from CFSTI.

RADIAL GAS DISPERSION IN A COLUMN PACKED WITH SCREEN CYLINDERS.
Revised ed.,
National Research Council of Canada Ottawa (Ontario) Div of Applied Chemistry
B. H. Chen, and G. L. Osberg. 26 Sep 66, 5p
NRC-9452
Revision of manuscript submitted 2 Jun 66.
Availability: Published in The Canadian Journal of Chemical Engineering n45 p46-50 Fee 1967.

Descriptors: (*Fluidized bed processes, Gas flow), Mass transfer, Diffusion, Turbulence, Reynolds number, Canada.
Identifiers: Reactors (Chemical).

Gaseous eddy diffusivity measurements were made by a point injection technique in a 6.5-in. column packed with open-end screen cylinders varying in size from 3/8-in. to 1 1/2-in. diameter, and made from wire cloth varying from 4 to 28 mesh/in. Oxygen was used as the tracer gas. Only packings made from 4 to 10 mesh/in. produced concentration profiles which were symmetric. The latter data show that turbulent diffusivity increases linearly with gas flow rate, but decreases with decreasing mesh opening and wire diameter. A correlation is presented for turbulent diffusivities as a function of the Reynolds number, ((dm) (u) (rho))/ mu, and the ratio dw/dm. (Author)
AD-653 391 Not available from CFSTI.

SOLIDIFICATION OF HIGH LEVEL WASTES. PART VI. MIXED PHOSPHATE, BORATE, SILICATE MELTS FOR FIXATION OF PUREX TYPE WASTES,
Battelle-Northwest, Richland, Wash. Pacific Northwest Lab.
For primary bibliographic entry see Field 18G.
For abstract, see NSA 21 12.
BNWL-373 HC$3.00 MF$0.65

ELECTROLYTIC PREPARATION OF URANOUS NITRATE,
Du Pont De Nemours (E. I.) and Co., Aiken, S. C. Savannah River Lab.
For primary bibliographic entry see Field 7B.
For abstract, see NSA 20 23.
DP-1065 HC$3.00 MF$0.65

ANNUAL REPORT OF DIVISION ANALYTICAL BRANCH FOR 1965,
Phillips Petroleum Co., Idaho Falls, Idaho. Atomic Energy Div.
For primary bibliographic entry see Field 18D.
For abstract, see NSA 20 23.
IDO-14679 HC$3.00 MF$0.65

PROCESSING OF PLUTONIUM BY ION EXCHANGE. VIII. SELF-DIFFUSION STUDIES IN ANION-EXCHANGE RESIN,
Los Alamos Scientific Lab., N. Mex.
D. B. James, and W. A. Beyer. 14 Sep 66, 12p
For abstract see NSA 20 23.

Descriptors: (*Plutonium, Ion exchange), (*Ion exchange resins, Diffusion), Diffusion, Radiochemistry, Radioactive isotopes, Chemical equilibrium, Sorption.

For abstract, see NSA 20 23.
LA-3534 HC$1.00 MF$0.50

PLANT-SCALE FLUID-BED DENITRATOR,
Mallinckrodt Chemical Works, Weldon Spring, Md. Uranium Div.

Group 7A — Chemical engineering

S. N. Robinson, and J. E. Todd. 1 Aug 66, 39p
Contract W-14-108-eng-8

Descriptors: (*Fluidized bed processes, Nitration), (*Uranyl radicals, *Nitrates), Refining (Metallurgy).

For abstract, see NSA 21 12.
MCW-1509 HC$3.00 MF$0.65

GEOMETRIC SCALING OF STACKED-CLONE CONTACTORS,
Oak Ridge National Lab., Tenn.
L. O. Finsterwalder. Apr 67, 19p
Contract W-7405-eng-26

Descriptors: (*Geometric forms, Statistical analysis), (*Hydraulic systems, *Solvent extraction), Performance (Engineering), Efficiency, Mass transfer, Uranyl radicals, Nitrates.

For abstract, see NSA 21 12.
ORNL-4088 HC$3.00 MF$0.65

STUDY OF COSTS OF PRODUCTION AND POTENTIAL FUTURE MARKETS FOR (PHASE I) LOW-BTU INDUSTRIAL FUEL-GAS (PRODUCER GAS) AND (PHASE II) INDUSTRIAL HYDROGEN.
Battelle Memorial Inst., Columbus, Ohio. Columbus Labs.
For primary bibliographic entry see Field 5C.
PB-174 835 HC$3.00 MF$0.65

7B. INORGANIC CHEMISTRY

A PROPOSED CHEMICAL INFORMATION AND DATA SYSTEM, VOLUME I.
Pennsylvania Univ., Philadelphia. Inst. for Cooperative Research.
For primary bibliographic entry see Field 5B.
AD-479 679 HC$3.00 MF$0.65

MAGNETIC PROPERTIES AND ELECTRONIC STRUCTURE OF LANTHANUM HYDRIDES,
Louisville Univ Ky Dept of Chemistry
For primary bibliographic entry see Field 20L.
AD-652 716 Not available from CFSTI.

CHEMICAL DATA COMPILATION ANALYSIS SURVEY.
Science Communication Inc Washington D C
For primary bibliographic entry see Field 5B.
AD-652 742 HC$3.00 MF$0.65

3,3,3-TRIFLUOROPROPYNE COMPLEXES,
Bristol Univ (England) Dept of Inorganic Chemistry
D. A. Harbourne, D. T. Rosevear, and F. G. A. Stone. 25 Jun 66, 5p
AFOSR-67-1128
Contract AF 61 (052)-847
Availability: Published in Inorg. Nucl. Chem. Letters v2 n9 p247-9 1966.

Descriptors: (*Halogenated hydrocarbons, *Complex compounds), (*Alkynes, Complex compounds), Fluorine compounds, Cobalt compounds, Metal carbonyls, Platinum compounds, Phosphines, Manganese compounds, Hydrides, Iodides, Great Britain.
Identifiers: Trifluoro propynes.

The acetylene 3,3,3-trifluoropropyne was used to prepare several new metal complexes. Reaction between CF3CCH and cobalt carbonyl affords (CF3CCH)2Co2 (CO)6 as the principal product. Tetrakis (triphenylphosphine)platinum reacts to give (Ph3P)2Pt((CF3CCH). A number of transition metal hydrides react with 3.3.3-trifluoropropyne to give addition products. Thus (Et3P)2Pt (Cl)H gives (Et3P)2Pt (CH=CHCF3)Cl and HMn (CO)5 gives CH2=C (CF3)Mn (CO)5 as well as other products. Reaction between tetrakis (triphenylphospine)platinum and perfluoroalkyl iodides gives air stable complexes such as (Ph3P)2Pt (C3F7)I. (Author)
AD-652 771 Not available from CFSTI.

THERMODYNAMIC STUDY OF SYNTHESIS OF NEW COMPOUND PHASES UNDER HIGH PRESSURE,
Manlabs Inc Cambridge Mass
For primary bibliographic entry see Field 11B.
AD-652 828 HC$3.00 MF$0.65

FAR INFRARED SPECTRA OF PALLADIUM COMPOUNDS-III TETRAHALO, TETRAAMMINE AND DIHALODIAMMINE COMPLEXES OF PALLADIUM (II),
Massachusetts Inst of Tech Cambridge Research Lab of Electronics
C. H. Perry, D. P. Athans, E. F. Young, J. R. Durig, and B. R. Mitchell. 25 Mar 66, 12p
Contract DA-36-039-AMC-03200 (E)
Prepared in cooperation with South Carolina Univ., Columbia. Dept. of Chemistry; Grants NSF-GP-2111, NSF-GP-2828.
Availability: Published in Spectrochimica Acta v23A p1137-47 1967.

Descriptors: (*Palladium compounds, *Spectra (Infrared)), (*Complex compounds, Palladium compounds), Halides, Amines, Molecular isomerism, Chemical bonds, Molecular association.

The infrared spectra of a number of square planar palladium (II) complexes of the type M2PdX4, PdL4X2, and trans and cis isomers of PdL2X2 (where M = NH4 (+), K (+), Rb (+), or Cs (+); L = NH3; X = Cl (-), Br (-), or I (-) were recorded from 4000 to 40/cm. The compounds were examined both at room temperature and at liquid nitrogen temperature. The investigation of four tetrachloropalladium (II) complexes gave Pd--Cl stretching vibrations in the range 327-336/cm, Pd--Cl in-plane bending vibrations in the range 183-205/cm, and Pd--Cl out-of-plane bending vibrations from 160 to 175/cm. Four similar bromo complexes gave the corresponding Pd--Br vibrations in the ranges 249-260/cm, 130-169/cm and 114-140/cm, respectively. The Pd--N in and out-of-plane bending vibrations of the tetraamine complexes were found in the ranges 245-273 and 160-190/cm, respectively. By using the assignments for the tetrahalo and tetraammine complexes as well as isotopic shift data, assignments for the fundamental modes for a series of cis and trans dihalodiammine complexes of palladium (II) are given and discussed. (Author)
AD-652 897 Not available from CFSTI.

UNPERTURBED DIMENSIONS OF POLYCATENASULPHUR AND POLYCATENASELENIUM,
Stanford Univ Calif Dept of Physics
For primary bibliographic entry see Field 7D.
AD-652 960 Not available from CFSTI.

BORON-FLUORINE CHEMISTRY. I. BORON MONOFLUORIDE AND SOME DERIVATIVES,
California Univ Berkeley Dept of Chemistry
P. L. Timms. 26 Oct 66, 7p
AROD-6366:1
Contract DA-31-124-ARO (D)-465
Availability: Published in Journal of the American Chemical Society v89 p1629-32 1967.

Descriptors: (*Boron compounds, *Fluorides), Synthesis (Ohemistry), Condensation, Polymers, Spectra (Infrared), Mass spectrum, Complex compounds, Carbon monoxide, Phosphines.
Identifiers: Boron fluorides.

High yields of gaseous boron monofluoride, BF, were obtained by passing BF3 over crystalline boron at 2000C under 1 mm pressure . The short-lived BF gas condenses to a green polymer at -196C, from which small amounts of volatile boron fluorides containing up to 14 boron atoms are released on warming. Cocondensation of BF and B2F4 gives B3F5, triboron pentafluoride, an unstable, very reactive compound. Condensation of BF in the presence of CO or PF3 gives (BF2)3BCO or (BF2)3BPF3, respectively, which are stable crystalline compounds. (Author)
AD-652 978 Not available from CFSTI.

CORRECTION FOR BROMIDE DURING CHLORIDE TITRATION OF SEA-ICE BRINE.
Snow Ice and Permafrost Research Establishment Wilmette Ill
For primary bibliographic entry see Field 8L.
AD-653 133 HC$3.00 MF$0.65

GASEOUS TERNARY COMPOUNDS OF THE ALKALI METALS.
Technical rept.,
Little (Arthur D) Inc Cambridge Mass
Alfred Buchler, and Joan Berkowitz-Mattuck. Jun 67, 122p
AROD-006:24-C
Contract DA-31-124-ARO (D)-315

Descriptors: (*Alkali metal compounds, Gases), Salts, Vapors, Thermochemistry, Chemical analysis, Molecular structure, Spectra (Infrared), Mass spectrum, Microwave spectroscopy, Hydroxides, Cyanides, Borates, Nitrates, Nitrites, Phosphates, Phosphites, Carbonates, Halides, Sulfates, Chromates, Molybdates, Tungstates, Intermetallic compounds, Reviews.
Identifiers: Molybdites, Rhenates, Tungstites.

An extensive summary is given of the existing information on gaseous ternary salts of the alkali metals. Three groups of compounds are considered: (1) salts of monobasic acids or pseudohalides (e.g., hydroxides, metaborates, nitrates, perrhenates); (2) salts of dibasic acids (e.g., carbonates, sulfates); (3) mixed halides (e.g., LiBeF3, NaAlF4, KFeCl3). The identification of vapor species, structural data, and thermodynamics are discussed for each type of compound. Particular experimental problems and methods of data analysis are considered as they arise with reference to individual compounds.
AD-653 163 HC$3.00 MF$0.65

THE VOLATILE RARE EARTH CHELATES OF 1, 1, 1, 2, 2, 3, 3 - HEPTAFLUORO - 7, 7 - DIMETHYL - 4, 6 - OCTANEDIONE.
Rept. for May 65-Feb 67,
Aerospace Research Labs Wright-Patterson AFB Ohio
Charles R. Springer, Jr., Robert E. Sievers, and Devon W. Meek. May 67, 114p Rept no. ARL-67-0094
Doctoral thesis submitted to Ohio State Univ., Columbus, Dept. of Chemistry.

Descriptors: (*Rare earth compounds, *Chelate compounds), (*Halogenated hydrocarbons, Chelate compounds), Fluorine compounds, Ketones, Salts, Synthesis (Chemistry), Scandium compounds, Chromium compounds, Aluminum compounds, Valence, Vaporization, Molecular association, Molecular structure, Hydrates, Fluorescence, Gas chromatography, Gas lasers.
Identifiers: Heptafluoro dimethyl octanedionates.

Inner complexes of fourteen trivalent rare earth ions with the bidentate ligand 1,1,1,2,2,3,3-heptafluoro-7,7-dimethyl-4,6-octanedionate, fod, were synthesized and studied. The products isolated have the formula, M (fod)3.H2O, but are easily

dehydrated in vacuo over P4O10 or by heating in an anhydrous atmosphere. The beta-diketonate ligand was synthesized via a Claisen condensation. The fod complexes of Sc (III), Cr (III), and Al (III) were also prepared and all found to have the formula, M (fod)3. The anhydrous rare earth complexes and the Sc, Cr, and Al compounds are six-coordinate. The chromium and aluminum complexes are octahedral but the structures of the rare earth and scandium complexes are unknown. The coordination numbers and structures of the hydrated rare earth complexes are also unknown. The anhydrous rare earth complexes are the most volatile rare earth compounds known, and they were studied by gas chromatography and thermogravimetric analysis. The volatilities of these compounds vary in inverse proportion with the ionic radius of the metal ion. (Author)
AD-653 183 HC$3.00 MF$0.65

THE UNSTABLE ARSINOBORON HETEROCYCLE ((CF3)2AsBH2)3. CHEMISTRY OF THE B5H9-ASSISTED TRIMERIZATION OF (CH3)2NBH2.
Technical rept.,
University of Southern California Los Angeles Dept of Chemistry
Anton B. Burg, Andrew P. Lane, and Jagtar S. Sandhu. 1966, 6p Rept no. TR-15
Contract Nonr-228 (13)
Availability: Published in Journal of the American Chemical Society v89 n4 p1040-1 Feb 15 1967; v89 n7 p1626-8 Mar 29 1967.

Descriptors: (*Boranes, Chemical properties), (*Arsenic compounds, Boranes), (*Amines, Boranes), Heterocyclic compounds, Synthesis (Chemistry), Spectra (Infrared), Molecular structure, Pentaboranes, Polymerization, Isotopes, Exchange reactions, Stereochemistry.
Identifiers: Aminoboranes, Arsinoboranes, B-heterocyclic compounds, Dimethyl aminoboranes.

Experimental results on the liquid-phase conversion of (CH3)2NBH2 to its trimer by means of B5H9 are consistent with a mechanism beginning with the disruption of the B5H9 by 2 (CH3)2NBH2 to form (CH3)2NB2H5 and (CH3)2NBH2.B4H6. The latter then would react further in three ways: (1) to support the growth of a polymeric ((CH3)2NBH2)n chain capable of rapid cyclization and re-formation of (CH3)2NBH2.B4H6; (2) to lose H2, forming nonvolatile ((CH3)2NBH2.B4H4)x; (3) to lose BH3 to form a second (CH3)2NB2H5 and nonvolatile ((CH3)2-NBH2.B3H3)x. The relative importance of each process depends upon the reactant ratios and concentrations; but (2) and (3) limit the repetition of (1). In connection with this study, an infrared technique for monitoring B10-B11 exchanges was developed. The infrared effects of axial steric interference in ((CH3)2NBH2)3 are seen by comparison with ((CH3)2PBH2)3, and the infrared spectrum of the by-product ((CH3)2N)2B4H6 is presented. Also included is a brief account of the discovery of the ring compound ((CF3)2AsBH2)3.
AD-653 249 Not available from CFSTI.

MORPHOLOGICAL FEATURES OF HEXAGONAL FERRITES,
Army Electronics Command Fort Monmouth N J Inst for Exploratory Research
Charles F. Cook, Jr., and William F. Nye. 1 Dec 66, 13p
Presented at the International Conference on the Characterization of Materials, State Coll., Pa., November 16-18, 1966.
Availability: Published in Materials Research Bulletin v2 p1-12 1967.

Descriptors: (*Ferrites, *Morphology (Biology)), Electron microscopy, Magnetic properties, Single crystals, Crystal structure, Phase studies, Crystal lattice defects, Sampling, Crystal growth, Photomicrography, Etching, Thickness, Error, Data. Measurement.

Depression growth spirals and vicinal-hill type spirals have been discovered on basal faces of single crystal hexagonal ferrite samples. Electron microscopy studies have resolved sub-unit-cell etch steps on 'process etched' and on HC1 etched surfaces. A variety of crystalline imperfections have been noted and etch pit studies have indicated the number and kinds of dislocations present. (Author)
AD-653 335 Not available from CFSTI.

H-1 AND F-19 NUCLEAR MAGNETIC RESONANCE SPECTRA OF THE ADDUCT BF3.H2O,
Mcmaster Univ Hamilton (Ontario) Dept of Chemistry
For primary bibliographic entry see Field 7D.
AD-653 389 Not available from CFSTI.

ELECTROLYTIC PREPARATION OF URANOUS NITRATE,
Du Pont De Nemours (E. I.) and Co., Aiken, S. C. Savannah River Lab.
G. Starr Nichols. Aug 66, 16p
Contract AT (07-2)-1

Descriptors: (*Uranyl radicals, Nitrates), (*Uranium compounds, Electrolysis).

For abstract, see NSA 20 23.
DP-1065 HC$3.00 MF$0.65

PLANT-SCALE FLUID-BED DENITRATOR,
Mallinckrodt Chemical Works, Weldon Spring, Md. Uranium Div.
For primary bibliographic entry see Field 7A.
For abstract, see NSA 21 12.
MCW-1509 HC$3.00 MF$0.65

THE SYNTHESIS AND UTILIZATION OF LOW MOLECULAR WEIGHT OZONIDES FOR AIR REVITALIZATION SUPPLEMENT TO INTERIM REPORT OF 14 NOV. 1965.
General Dynamics Corp., Groton, Conn. Electric Boat Div.
A. Capotosto, Jr., J. A. Marriott, A. W. Petrocelli, and R. Uno. 14 Jun 66, 114p NASA-CR-84469, V-413-66-081
Contract NASW-559

Descriptors: *Calcium oxide, *Lithium oxide, *Magnetic susceptibility, *Sodium peroxide, *Thermal decomposition, Analysis, Calcium, Catalyst, Decomposition, Differential, Effect, Lithium, Magnetic, Metal, Organic, Oxide, Peroxide, Rate, Sodium, Superoxide, Susceptibility, Temperature, Thermal, Thermogravimetry.

For abstract, see STAR 05 14.
N67-27504 HC$3.00 MF$0.65

CARBON ISOTOPE FRACTIONATION IN THE SYSTEM C O2/GAS/- C O2/AQUEOUS/- H C O3-/AQUEOUS/.
Woods Hole Oceanographic Institution, Mass. E. T. Degens, and W. G. Deuser. 1967, 13p
NASA-CR-84428
Contract NSR-22-014-001

Descriptors: *Bicarbonate, *Carbon dioxide, *Carbon 13, *Fractionation, *Isotope, Acid, Aqueous, Equilibrium, Experiment, Gaseous, Hydration.

For abstract, see STAR 05 14.
N67-27703 HC$3.00 MF$0.65

7C. ORGANIC CHEMISTRY

A PROPOSED CHEMICAL INFORMATION AND DATA SYSTEM, VOLUME I.
Pennsylvania Univ., Philadelphia. Inst. for Cooperative Research.
For primary bibliographic entry see Field 5B.
AD-479 679 HC$3.00 MF$0.65

PHOSPHONITRILIC FLUOROALKOXIDE POLYMERS,
English Electric Co., Ltd., Luton.
M. V. Lenton. Sep 66, 49p
D-Mat-139

Descriptors: (*Organic phosphorus compounds, Polymers), (*Synthesis (Chemistry), Organic phosphorus compounds), Substitution reactions, Polymerization, Elastomers, Phosphonitrile chlorides, Phosphites, Alcohols, Alkanes, Great Britain, Amines, Plastics, Azides, Polyester plastics, Fluorine compounds.
Identifiers: Phosphonitriles, Alkoxides.

A series of fluoroalkoxy substituted trimeric phosphonitrile ring compounds has been prepared. Attempts to polymerise the hexa (fluoroalkoxy) triphosphonitriles failed. Unsymmetrical substituted derivatives containing two different fluoroalkoxy groups have been evaluated as high temperature fluid materials. Substitution of fluoroalkoxy groups into phosphonitrilic chloride rubbery high polymer has yielded hydrolytically stable elastomers of poor thermal stability, in which considerable cross-linking is postulated. The preparation and properties of some fluoroalkyl phosphites and chlorophosphites are describeu. Phosphonitrile polymer formation from these materials by reaction with alkali metal azides proved impossible Attempts to prepare bis (fluoroalkoxy) trichlorophosphoranes failed to yield the required materials. All attempts at the partial replacement of the chlorine atoms in phosphonitrilic chloride trimer, by fluoroalkoxy groups, gave complex isomer mixtures of varying degrees of substitution from which pure materials could not be separated. A series of diamino tetrakis (fluoroalkoxy)triphosphonitriles has been prepared, and the condensation polymerisation with fluorinated dihydroxy alcohols studied. The products of the condensation are in some cases elastomeric, and may lead towards a new type of potentially useful rubbery material. (Author)
AD-643 548 HC$3.00 MF$0.65

STUDY OF ROTATIONAL ISOMERISM IN FLUOROACETYL FLUORIDE BY MICROWAVE SPECTROSCOPY,
Harvard Univ., Cambridge, Mass. Mallinckrodt Lab.
For primary bibliographic entry see Field 7D.
AD-645 803 HC$3.00 MF$0.65

IDENTIFICATION AND CHARACTERIZATION OF PETROLEUM FUELS USING TEMPERATURE-PROGRAMMED GAS-LIQUID CHROMATOGRAPHY.
Army Coating and Chemical Lab., Aberdeen Proving Ground, Md.
For primary bibliographic entry see Field 21D.
AD-646 382 HC$3.00 MF$0.65

CHEMICAL DATA COMPILATION ANALYSIS SURVEY.
Science Communication Inc Washington D C
For primary bibliographic entry see Field 5B.
AD-652 742 HC$3.00 MF$0.65

PREPARATION OF PHENYL-N-SULFINYLHYDRAZINES USING DIMETHYLFORMAMIDE-SULFUR DIOXIDE REAGENT,
Kentucky Univ Lexington Dept of Chemistry
Walter T. Smith, Jr., and Wen-Yean Chen. 1966, 5p
AFOSR-67-1185
Contract AF 49 (638)-49

Availability: Published in Transactions of the Kentucky Academy of Science v27 n1/2 p37-9 1966.

Descriptors: (*Hydrazine derivatives, Synthesis (Chemistry)), (*Organic sulfur compounds, Synthesis (Chemistry)), Formamides, Sulfur compounds, Dioxides, Ethers, Organic nitrogen compounds, Bromine compounds.
Identifiers: Phenyl sulfinylhydrazines.

It was found that a solution of sulfur dioxide in dimethylformamide provides a convenient reagent for the preparation of the compounds of phenyl-N-sulfinylhydmzine. The method is simple and direct and was used to prepare phenyl-, 4-carboxyphenyl-, 2- and 4-nitrophenyl-, and 4-bromophenyl-N-sulfinylhydrazines in yields of 16-55 percent. (Author)
AD-653 045 Not available from CFSTI.

PURIFICATION OF ORGANIC MATERIALS AND STUDY OF POLYMERS THEREFROM.
Final rept., 1 Jul 65-30 Jun 66,
Minnesota Mining and Mfg Co St Paul Central Research Labs
Robert J. Koshar, and William C. Johnson. Jul 66, 42p
Contract NOw-65-0490

Descriptors: (*Polymers, Purification), (*Polyamide plastics, Performance (Engineering)), (*Nylon, Performance (Engineering)), (*Isocyanate plastics, Performance (Engineering)), Organic materials, Dibasic acids, Amines, Impurities, Crystallization, Chromatographic analysis, Freezing, Viscosity, Differential thermal analysis, Films, Electrical properties, Mechanical properties, Molecular weight, Tensile properties.
Identifiers: Adipic acid, Poly (ethylene methylene bis (phenylcarbamates)), Triethylene diamines.

Research was undertaken in order to attain and measure the high degree of purity of specific monomers and to determine the effects of their high purity on the performance of the resultant polymer. Attempts were made to establish the ultimate performance that could be expected from selected polymers as well as the extent of effort required for purification of monomers beyond presently used procedures. The major portion of the research relates to poly(hexamethyleneadipamide), nlyon 66, and the effects of the high purity of adipic acid and hexamethylenediamine on various properties of the polyamide. Research was also initiated on the purification and measurement of purity monomers and solvents for polymerization to poly (ethylene methylene bis (4-phenylcarbamate)). (Author)
AD-653 109 HC$3.00 MF$0.65

A PEROXIDE FRAGMENTATION REACTION,
Autonetics Anaheim Calif Research and Engineering Div
William H. Richardson, and Ronald S. Smith. 12 Dec 66, 4p
AROD-5546:3
Grant DA-ARO (D)-31-124-G657
Availability: Published in Journal of the American Chemical Society v89 p2230 1967.

Descriptors: (*Peroxides, Decomposition), Propionic acid, Bases (Chemistry), Amines, Butanols, Acetones, Carbon dioxide, Synthesis (Chemistry), Elimination reactions.
Identifiers: Butylperoxy methylpropionic acids.

A unique decomposition of a tertiary peroxide in a basic medium is reported. The reaction involves the formation of t-butyl alcohol, acetone, and carbon dioxide when 2-t-butyl peroxy-2-methyl-propionic acid is treated with triethylamine in chlorobenzene. The reaction mechanism is discussed.
AD-653 231 Not available from CFSTI.

REARRANGEMENTS AND OTHER REACTIONS OF BENZYL-TYPE QUARTERNARY AMMONIUM IONS WITH CERTAIN ORGANOLITHIUM REAGENTS,
Duke Univ Durham N C Dept of Chemistry
Karl P. Klein, Donald N. Van Eenam, and Charles R. Hauser. 14 Oct 66, 9p
AROD-3581:23
Grants DA-ARO (D)-31-124-G770, NSF-GP-2774
Availability: Published in Journal of Organic Chemistry v32 p1155-60 1967.

Descriptors: (*Ammonium compounds, Chemical reactions), (*Lithium compounds, *Metalorganic compounds), Benzenes, Salts, Bromides, Iodides, Amines, Synthesis (Chemistry).
Identifiers: Butyl lithium, Benzyl trimethylammonium compounds, Benhydryl trimethylammonium compounds, Dibenzyl dimethylammonium compounds, Rearrangement reactions.

The benzyl trimethylammonium ion reacted with n-butyllithium in ether-hexane to form mainly the ortho-substitution rearrangement product, usually a considerable amount of a Stevens 1,2-shift product and smaller amounts of another Stevens product, three higher boiling amines, and a displacement product. The benzhydryl trimethylammonium ion reacted with this reagent to afford mainly a Stevens 1,2-shift product, a considerable amount of the ortho-rearrangement product (mostly as the benzhydryl derivative), and some tetraphenylethane. The dibenzyl dimethylammonium ion reacted with this reagent to produce mainly displacement products, appreciable amounts of a Stevens 1,2-shift product, and smaller amounts of the ortho-rearrangement product and stilbene. (Author)
AD-653 234 Not available from CFSTI.

PHOTOFRAGMENTATION OF EPOXIDES. IV. PRECURSORS FOR PHENYLCYANOCARBENE,
Louisiana State Univ New Orleans Dept of Chemistry
For primary bibliographic entry see Field 7E.
AD-653 239 Not available from CFSTI.

THE UNSTABLE ARSINOBORON HETEROCYCLE ((CF3)2AsBH2)3. CHEMISTRY OF THE B5H9-ASSISTED TRIMERIZATION OF (CH3)2NBH2.
University of Southern California Los Angeles Dept of Chemistry
For primary bibliographic entry see Field 7B.
AD-653 249 Not available from CFSTI.

THE REVERSIBLE THERMAL DECOMPOSITION OF TRIPHENYLMETHYLPEROXY RADICAL TO TRIPHENYLMETHYL RADICAL AND OXYGEN,
Georgia Univ Athens Dept of Chemistry
Edward G. Janzen, F. J. Johnston, and Caroline L. Ayres. 19 Oct 66, 11p
AFOSR-67-1283
Grants AF-AFOSR-1069-66, PHS-RH-00206
Availability: Published in Journal of the American Chemical Society v89 n5 pp1176-83 Mar 1 1967.

Descriptors: (*Peroxides, Free radicals), (*Free radicals, Decomposition), Oxygen, Chemical equilibrium, Pyrolysis, Heat of reaction, Heat of activation, Reaction kinetics, Electron spin resonance, Pnramagnetic resonance, Entropy, Aromatic compounds.
Identifiers: Triphenylmethyl radicals.

The reaction of triphenylmethyl radical with oxygen in a solid lattice permeable to oxygen was studied. The reaction is found to be reversible: Ph3C- + O2 = Ph3COO-. At room temperature under atmospheric oxygen pressure very little triphenylmethyl radical exists in equilibrium with the peroxy radical, but at 130C essentially no peroxy radical can be detected. Evacuation at room temperature converts the peroxy radical to triphenylmethyl radical. For the reaction of triphenylmethyl radical with oxygen, the heat of reaction = -9 plus or minus 1 kcal/mole. An energy of activation for the thermal decomposition of triphenylmethylperoxy radical of 10.2 plus or minus 1 kcal/mole is estimated. (Author)
AD-653 259 Not available from CFSTI.

CHEMISTRY OF POSITIVE IONS. VI. POSITIVE-ION CHEMISTRY IN SOLID METHANE,
California Univ Los Angeles
For primary bibliographic entry see Field 7E.
AD-653 381 Not available from CFSTI.

EVIDENCE FOR THE FORMATION AND UNIMOLECULAR DECOMPOSITION OF TRIMETHYLENE BIRADICAL INTERMEDIATES IN THE REACTION OF TRIPLET METHYLENE WITH OLEFINS,
National Research Council of Canada Ottawa (Ontario) Div of Applied Chemistry
For primary bibliographic entry see Field 7D.
AD-653 394 Not available from CFSTI.

SYNTHESIS AND CHEMICAL REACTIONS OF SOME CONJUGATED HETEROENOID COMPOUNDS.
Suffield Experimental Station Ralston (Alberta)
R. F. Silver, K. Ann Kerr, Peggy D. Frandsen, Sheila J. Kelley, and H. L. Holmes. 3 Aug 66, 7p
Rept no. Suffield Technical paper-316
Availability: Published in Canadian Journal of Chemistry v45 p1001-6 1967.

Descriptors: (*Alkenes, Chemical properties), Ketones, O-heterocyclic compounds, Acetates, Esters, Amides, Nitriles, Styrenes, Benzenes, Amines, Thiols, Acetamides, Synthesis (Chemistry), Chemical reactions, Molecular structure, Spectra (Infrared), Chemotherapeutic agents, CNS stimulants, Selection, Canada.
Identifiers: Heteroenoids.

A series of 326 3-benzal-2,4-pentanediones, 2-benzal-1,3-indanediones, ethyl benzalacetoacetates, diethyl benzalmalonates, ethyl benzalcyanoacetates, benzalmalononitriles, benzalcyanoacetamides, benzalcyanoacetanilides, benzalmalonamides, beta-nitrostyrenes, beta-nitropropenylbenzenes, beta - nitrobutenylbenzenes, and derivatives of a number of cinnamic acids were synthesized and their geometric configuration discussed. Aniline, p-toluidine, and n-butanethiol were added to some of these compounds. The aniline adducts were also prepared from benzylideneaniline and the active methylene compounds. The aniline adducts of those containing a cyano group are not stable and lose aniline at room temperature. The structure of the compound prepared from benzylideneaniline and ethyl cyanoacetate and melting at 140C was established. (Author)
AD-653 398 Not available from CFSTI.

RATES OF ADDITION OF METHYL RADICALS TO OLEFINS IN THE GAS PHASE,
National Research Council of Canada Ottawa (Ontario) Div of Applied Chemistry
For primary bibliographic entry see Field 7D.
AD-653 399 Not available from CFSTI.

INVBSTIGATION OF THE CATALYTIC INTERACTION OF HYDROGEN CHLORIDE AND METHANOL. PART II - KINETICS OF DEHYDRATION OF METHANOL AND HYDROCHLORINATION OF DIMETHYL ETHER ON CATALYSTS USED FOR VAPOR-PHASE SYNTHESIS OF METHYL CHLORIDE.
Issledovaniya V Oblasti Kataliticheskogo Vzaimodeystviya Khloristogo Vodoroda I Metanola. Ii - Kinetika Reaktsiy Degidra- Tatsii Metanola I Gidrokhlorirovaniya Dimetilovogo Efira Na Katalizatorakh Parofaznogo Sinteza Khloristogo Metila

National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
R. M. Flid, and YE. B.Svetlanov. May 67, 7p
NASA-TT-F-10937
Transl. Info English From Zh. Fiz. Khim. (Moscow), V. 40, No. 12, 1966 P 3055-3059

Descriptors: *Catalyst, *Chemical kinetics, *Methyl chloride, *Synthesis, Butyl, Chemical, Chloride, Chlorination, Dehydration, Dimethyl, Ether, Kinetics, Methane, Methyl, Phase, Polymer, Rubber, Silicon, Vapor.

For abstract, see STAR 05 14.
N67-27417 HC$3.00 MF$0.65

SATURATED HYDROCARBON POLYMERIC BINDER FOR ADVANCED SOLID PROPELLANT AND HYBRID SOLID GRAIN QUARTERLY REPORT, 1 NOV. 1966 - 31 JAN. 1967.
Union Carbide Corp., Bound Brook, N. J. Plastics Div.
J. E. Potts. 31 Jan 67, 21p NASA-CR-84443, QR-5
Contracts NAS7-100, JPL-951210
Prepared for Jpl

Descriptors: *Hybrid propellant, *Hydrocarbon, *Propellant binder, *Solid propellant, Binder, Ethylene, Grain, Hexene, High pressure, Hybrid, Polymer, Propellant, Reactor, Saturation, Solid, Tube.

For abstract, see STAR 05 14.
N67-27428 HC$3.00 MF$0.65

7D. PHYSICAL CHEMISTRY

A PROPOSED CHEMICAL INFORMATION AND DATA SYSTEM, VOLUME I.
Pennsylvania Univ., Philadelphia. Inst. for Cooperative Research.
For primary bibliographic entry see Field 5B.
AD-479 679 HC$3.00 MF$0.65

STUDY OF ROTATIONAL ISOMERISM IN FLUOROACETYL FLUORIDE BY MICROWAVE SPECTROSCOPY,
Harvard Univ., Cambridge, Mass. Mallinckrodt Lab.
Ellen Saegebarth, and E. Bright Wilson, Jr. 1966, 48p
Contract Nonr-1866 (14), Grant NSF-GP-6413

Descriptors: (*Microwave spectroscopy, *Fluorine compounds), (*Halogenated hydrocarbons, *Molecular isomerism), Dipole moments, Stark effect, Chemical bonds, Rotation, Band spectrum, Intensity, Thermochemistry, Molecular structure.
Identifiers: Fluoroacetyl fluorides.

Fluoroacetyl fluoride was found to have two distinct sets of pure rotational transitions in the microwave region 8 to 36 kMc/sec, which was identified as arising from two rotamers, one with the two fluorine atoms trans to one another and the other in which they are in the cis positions. These spectra were analysed and moments of inertia obtained. The Stark effect gives the dipole moment components: trans Mu-a = 0.456 plus or minus 0.010 D, Mu-b = 2.63 plus or minus 0.05 D, Mu = 2.67 plus or minus 0.05 D; cis Mu-a = 1.18 plus or minus 0.03 D, Mu-b = 1.68 plus or minus 0.04 D, Mu = 2.05 plus or minus 0.06 D; Mu-c = 0 for both forms. Several sets of satellite lines were observed and assigned to torsionally excited trans molecules, to a skeletal bending mode, and to a combination of these. Relative intensities then gave trans frequencies near 127/cm for the torsion and 265/cm for the bending. Intensities also gave an energy difference, cis-trans, of 910 plus or minus 100 cal/mole. The available data do not completely define the torsional potential function but suggest that the three-fold component may be in the range 1000-1300 cal/mole as in acetyl derivatives. The two-fold component must be dominant to produce the cis instead of gauche minimum. (Author)
AD-645 803 HC$3.00 MF$0.65

MAGNETIC PROPERTIES AND ELECTRONIC STRUCTURE OF LANTHANUM HYDRIDES,
Louisville Univ Ky Dept of Chemistry
For primary bibliographic entry see Field 20L.
AD-652 716 Not available from CFSTI.

SUM-FREQUENCY-GENERATED SPECTRA OF GASES AND LIQUIDS,
Pennsylvania Univ Philadelphia Dept of Chemistry
Norah V. Cohan, and Hendrik F. Hameka. 11 Apr 66, 3p
Contract SD-69, Grant NSF-GP-5411
Availability: Published in The Journal of Chemical Physics v45 n10 p3825-6 Nov 15 1966.

Descriptors: (*Spectroscopy, Theory), Gases, Liquids, Resonance, Coherent radiation, Monochromatic light.

The theory of sum-frequency-generated spectra of gases and liquids is derived for the case of resonance. The results are in agreement with the previously derived nonresonance theories by Giordmaine and others. It is suggested that the resonance case can be studied by means of an experiment where one of the incident beams comes from a laser source while the other incident beam is ordinary polarized monochromatic light of variable frequency. (Author)
AD-652 717 Not available from CFSTI.

BORN-OPPENHEIMER APPROXIMATION AND THE CALCULATION OF INFRARED INTENSITIES,
Pennsylvania Univ Philadelphia Dept of Chemistry
Norah V. Cohan, and Hendrik F. Hameka. 20 Jun 66, 9p
Contract SD-69, Grant NSF-GP-5411
Availability: Published in The Journal of Chemical Physics v45 n12 p4392-9 Dec 15 1966.

Descriptors: (*Molecular association, Approximation (Mathematics)), (*Infrared spectroscopy, Intensity), Molecular properties, Hamiltonian, Molecular spectroscopy, Diatomic molecules, Electron transitions.
Identifiers: Born-Oppenheimer method.

In evaluating transition moments it is customary to transform from the momentum representation to the dipole representation by making use of the commutator relations between the Hamiltonian and the particle coordinates. It is shown that in the case of infrared, vibrational transitions it makes quite a difference whether the Born-Oppenheimer approximation is introduced before or after this transformation. In the first case the transition moment depends on the nuclear contribution to the molecular dipole moment and in the second case on the total dipole moment of the molecule. In order to dissolve this discrepancy is calculated the first-order correction to the Born-Oppenheimer approximation. This correction was introduced in the transition moment calculations and it was found that the correction terms bring the two different results into agreement with each other. It was found that the correction is quite small in the case where the Born-Oppenheimer approximation is introduced after the momentum-dipole transformation and that the correction is considerable in the case where the Born-Oppenheimer approximation is introduced before the transformation. It is concluded that the correct expression for the transition moment contains the derivative of the molecular dipole moment with respect to the normal coordinates of the modes of vibration, in agreement with the expressions that are customarily used. (Author)
AD-652 719 Not available from CFSTI.

X-RAY SPECTROCHEMICAL METHODS FOR ANALYSIS OF COPPER ALLOYS.
Army Weapons Command Rock Island Ill Research and Engineering Div
For primary bibliographic entry see Field 11F.
AD-652 733 HC$3.00 MF$0.65

PARAMAGNETIC RESONANCE STUDIES OF BONDING IN (CrCl5 (H2O)) (2-),
Illinois Univ Urbana Noyes Chemical Lab
H. S. Gutowsky, Barry B. Garrett, and Keith DeArmond. 10 Jan 66, 7p
Grant NSF-GP-1964
Prepared in cooperation with Florida State Univ., Tallahassee. Dept. of Chemistry, and North Carolina State Univ., Raleigh. Dept. of Chemistry.
Availability: Published in The Journal of Chemical Physics v44 n9 p3393-9 May 1 1966.

Descriptors: (*Complex compounds, Molecular association), (*Chromium compounds, Complex compounds), Electron spin resonance, Paramagnetic resonance, Ammonium compounds, Indium compounds, Chlorides, Molecular orbitals, Nuclear spins.

Single-crystal, room-temperature electron spin resonance spectra are reported for the complex ion (CrCl5 (H2O)) (2-) in the host lattice (NH4)2 (InCl5 (H2O)). The spectra are analyzed by means of a rhombic spin Hamiltonian and the spin-Hamiltonian parameters are related to an LCAO-MO description of the ligand-Cr (3+) bonding. The complexity of the d3 system and the lack of sufficient experimental parameters prevented the direct evaluation of molecular orbital mixing coefficients from the ESR and optical data as was accomplished previously for tetragonal d1 complexes. However, an independent estimate of the spin-orbit coupling is used to establish interrelationships among the four molecular orbital mixing coefficients of interest and serves as a basis for discussing the bonding in (CrCl5 (H2O)) (2-). Evidence is found for pi bonding to the H2O. Also, as in the case of the d1 complexes, charge-transfer states are found to contribute significantly to g and to the zero-field splitting parameter D. The sign of their contribution to D is controlled by the mixing coefficients and can be either positive or negative; the contribution of doublet states appears to be small. (Author)
AD-652 738 Not available from CFSTI.

NUCLEAR MAGNETIC RESONANCE METHODS FOR DETERMINING CHEMICAL-EXCHANGE RATES,
Illinois Univ Urbana Noyes Chemical Lab
Adam Allerhand, H. S. Gutowsky, J. Jonas, and R. A. Meinzer. 18 Feb 66, 10p
Grant NSF-GP-5388
Research supported in part by ONR and NIH.
Availability: Published in Journal of the American Chemical Society v88 n14 p3185-93 Jul 20 1966.

Descriptors: (*Exchange reactions, *Nuclear magnetic resonance), Reaction kinetics, Line spectrum, Errors, Mathematical models, Approximation (Mathematics).

Factors which affect the accuracy of high-resolution and spin-echo nmr determinations of chemical-exchange rates are analyzed and discussed, including mathematical as well as experimental aspects. Numerical methods show that most of the mathematical approximations commonly used to evaluate exchange rates from high-resolution spectra are subject to systematic error, and circumstances under which the error becomes serious are presented. A line-width equation is derived which gives accurate exchange rates in the vicinity of the coalescence point for an uncoupled AB system, and from which the chemical shift at the coalescence point can be obtained. The effects of saturation broadening are calculated and compared with experiment. In general, it appears desir-

able to determine exchange rates from high-resolution spectra by using computerized, complete line-shape fitting methods which do not neglect spectral complications unless their effects are demonstrably less than other inaccuracies in the rates. In rate determinations by the spin-echo method which employs a Carr-Purcell train of echoes, it is possible for self-diffusion to cause systematic error. Simple criteria are presented for estimating and minimizing such effects. Other presently known factors peculiar to the spin-echo method, including the effects of finite pulse widths, do not appear to present serious problems. (Author)
AD-652 739 Not available f rom CFSTI.

REMARKS ON 'SPIN DIPOLE INTERACTION IN O2',
Brown Univ Providence R I
Kunifusa Kayama, and James C. Baird. 19 Mar 65. 1p
Grant NSF-GP-5125
Availability: Published in The Journal of Chemical Physics v43 n3 p1082-3 Aug 1 1965.

Descriptors: (*Oxygen, Molecular orbitals), (*Molecular orbitals, Nuclear spins), Dipole moments, Interactions, Molecular energy levels, Excitation, Perturbation theory, Molecular spectroscopy.

A previous paper by Kayama (J. Chem. Phys. v42 p662 1965) stated that the experimental value of the electron-spin dipole-dipole interaction parameter 'lambda (e)-ss' could not be understood using convential concepts of molecular electronic structure. It has since been found, however, that an unsatisfactory point exists in previous treatments concerning the spin-orbit interaction which affects 'lambda (e)-ss'. Clarification of this point permitted a preliminary calculation of the interaction parameter through an LCAO-MO approach. Thus, 'lambda (e)-ss' = -1/2 (DE)=0.84/cm, where DE is the energy change of the (3)Sigma-g (-) (Sz=0) state.
AD-652 740 Not available from CFSTI.

CHEMICAL DATA COMPILATION ANALYSIS SURVEY.
Science Communication Inc Washington D C
For primary bibliogmphic entry see Field 5B.
AD-652 742 HC$3.00 MF$0.65

E.S.R. SPECTRA OF SUBSTITUTED PYRIDINE AND PYRIMIDINE ANION RADICALS.
Brown Univ Providence R I
Peter T. Cottrell, and Philip H. Rieger. 22 Sep 66, 11p
Grant NSF-GP-5016
Availability: Published in Molecular Physics v12 n2 p149-58 1967.

Descriptors: (*Pyridines, Electron spin resonance), (*Pyrimidines, Electron spin resonance), (*Electron spin resonance, *N-heterocyclic compounds), Free radicals, Hyperfine structure, Molecular orbitals, Ions, Organic nitrogen compounds, Chlorine compounds.
Identifiers: Chloro nitropyridines, Dinitropyridines, Methylpyridyl ketones, Nitropyridines, Nitropyrimidines.

Electron spin resonance spectra were obtained of the 3-nitropyridine, 3,5-dinitropyridine, 2-chloro-5-nitropyridine, 5-nitropyrimidine, 3-acetylpyridine anion radicals produced electrolytically in dimethyl-sulphoxide solutions. Hyperfine splitting constants were assigned in some cases with the help of molecular orbital calculations. The 3-acetylpyridine anion exists in two isomeric forms, the spectra of which were observed. Ionization of chloride from 2-chloro-5-nitropyridine, 2-chloro-3-nitropyridine, and 2-chloro-5-nitropyrimidine occurred on reduction, yielding the 3-nitropyridine anion from the first two compounds, and the 5-nitropyrimidine anion from the third. Analysis of the data suggests that, for this series of radicals, the sigma-pi parameter Q is in the range O > or = Q > or = -2.5 gauss. (Author)
AD-652 747 Not available from CFSTI.

OBSERVATION OF TIME-DEPENDENT CONCENTRATION FLUCTUATIONS IN CRITICAL MIXTURES,
Kansns Univ Lawrence Dept of Chemistry
B. Chu. 9 Jan 67, 4p
Grant NSF-GP-6693
Research supported in part by ARO (D).
Availability: Published in Physical Review Letters v18 n6 p200-2 Feb 6 1967.

Descriptors: (*Phase studies, *Concentration (Chemistry)), Fatty acids, Water, Mixtures, Coherent radiation, Scattering, Time.
Identifiers: Butyric acids, Critical mixtures.

The letter presents recent measurements on the angular dependence of the spectral distribution of quasielastically scattered light from a binary fluid mixture, isobutyric acid and water, near its critical mixing point.
AD-652 748 Not available from CFSTI.

ATOMIC READJUSTMENT TO AN INNER-SHELL VACANCY: MANGANESE K X-RAY EMISSION SPECTRA FROM AN Fe55 K-CAPTURE SOURCE AND FROM THE BULK METAL.
Cornell Univ Ithaca N Y Lab of Atomic and Solid State Physics
For primary bibliographic entry see Field 7E.
AD-652 754 Not available from CFSTI.

THE SPIN POLARIZED HARTREE-FOCK METHOD AND THE CONTRIBUTIONOF CORE POLARIZATION TO HYPERFINE FIELDS OF 4d IONS,
Massachusetts Inst of Tech Cambridge National Magnet Lab
For primary bibliographic entry see Field 20C.
AD-652 756 Not available from CFSTI.

A REVIEW OF GAS CHROMATOGRAPHIC-MASS SPECTROMETRIC METHODS OF ANALYSIS.
Interim rept.,
Naval Research Lab Washington D C
F. E. Saalfeld. 23 Mar 67, 22p Rept no. NRL-6525

Descriptors: (*Gas chromatography, Reviews), (*Mass spectroscopy, Reviews), Controlled atmospheres, Impurities, Test methods, Instrumentation? Interfaces, Monitors.

A literature survey of the gns chromatographic-mass spectrometric methods of analysis was made which provides a comprehensive review of the past and present research efforts on the identification of gas chromatograph effluents with a mass spectrometer. The various types of instrumentation employed are described briefly, and critical assessments are made of the various techniques for tandem operation of a gas chromatograph and a mass spectrometer. (Author)
AD-652 823 HC$3.00 MF$0.65

RESEARCH AND DEVELOPMENT OF PHYSICAL METALLURGY OF TITANIUM.
IIT Research Inst Chicago Ill
For primary bibliographic entry see Field 11F.
AD-652 829 HC$3.00 MF$0.65

THERMOGRAVIMETRY OF PHENOL-FORMALDEHYDE POLYCONDENSATES. PART II. EMPIRICAL KINETIC PARAMETERS.
Air Force Materials Lab Wright-Patterson AFB Ohio
For primary bibliographic entry see Field 11I.
AD-652 844 HC$3.00 MF$0.65

DILUTE SOLUTION PROPERTIES OF HIGH-MOLECULAR-WEIGHT POLY (ISOBUTYL METHACRYLATE). VIII. GEL PERMEATION CHROMATOGRAPHY.
Technical rept.,
Picatinny Arsenal Dover N J Feltman Research Labs
Susan Doherty, and Richard J. Valles. May 67, 41p
PA-TR-3511
See also AD-633 470.

Descriptors: (*Acrylic resins, Molecular weight), Chromatographic analysis, Gels, solutions, Permeability, Standardization, Distribution.
Identifiers: Poly (isobutyl methacrylates).

Fractions of poly (isobutyl methacrylate) were dissolved in tetrahydrofuran and run at 25C. Values of -Aw and -An were obtained. The molecular weight of most of the fractions had been obtained previously by light scattering measurements. From the values of -Aw and -An and the 'Q' factor, molecular weights were obtained that were completely erroneous. However, a correlation between -Aw and -Mw was determined. Without the previously determined information on molecular weight, it would have been impossible to determine this quantity from gel permeation chromatography alone. The molecular weight distribution was studied only briefly. (Author)
AD-652 879 HC$3.00 MF$0.65

FAR INFRARED SPECTRA OF PALLADIUM COMPOUNDS-III TETRAHALO, TETRAAMMINE AND DIHALODIAMMINE COMPLEXES OF PALLADIUM (II),
Massachusetts Inst of Tech Cambridge Research Lab of Electronics
For primary bibliographic entry see Field 7B.
AD-652 897 Not available from CFSTI.

ANODIC DISINTEGRATION OF METALS UNDERGOING ELECTROLYSIS IN AQUEOUS SALT SOLUTIONS.
Missouri Univ Rolla
For primary bibliographic entry see Field 11F.
AD-652 912 Not available from CFSTI.

INFRARED REFLECTANCE AND OPTICAL CONSTANTS OF TEKTITES,
Massachusetts Inst of Tech Cambridge
For primary bibliographic entry see Field 20F.
AD-652 913 Not available from CFSTI.

THE PROPERTIES OF NITROGEN UP TO 15,000K,
Advisory Group for Aeronautical Research and Development Paris (France)
H. Maecker. Sep 59, 14p Rept no. AGARD-324
N62-14521
NATO Furnished.

Descriptors: (*Nitrogen, Physical properties), Electric arcs, Gas discharges, Spectroscopy, Electrical conductance, Thermal conductivity, Thermal properties, High-temperature research.

With a newly developed cylindrical cascade arc for high power input, and with the development of the theory of the arc, it was possible to determine the electrical conductivity, the heat conductivity and the heat flux potential of nitrogen up to 15,000K by means of electrical and spectroscopic measurements. (Author)
AD-652 929 HC$3.00 MF$0.65

THE CARBON-OXYGEN REACTION: AN EXPERIMBNTAL STUDY OF THE OXIDATION OF SUSPENDED CARBON SPHERES.
Technical rept.,
Pennsylvania State Univ University Park Dept of Fuel Science
R. H. Essenhigh, and R. W. Froberg. Jun 67, 241p
Rept no . FS67-2 (U)
Contract Nonr-656 (29)
Doctoral thesis.

Descriptors: (*Carbon, *Oxidation), Spheres, Reaction kinetics, Thermochemistry, Heat of activation, Diffusion, Differential equations, Combustion.

Analysis of the carbon-oxygen reaction, at normal pressures, with the use of simultaneous size and weight measurements on single spheres, has substantiated the three zone theory for solid-gas reactions. Experimental results have shown that the true chemical reaction is of zero order with an apparent activation energy of 45 kcal/mole. By combining a zero order, chemical reaction, rate expression with diffusion expressions, it was found that over the temperature range investigated in this study, the overall reaction rate may be described by a single rate expression. (Author)
AD-652 933 HC$3.00 MF$0.65

THE ROLE OF SURFACE DIFFUSION IN HETEROGENEOUS NUCLEATION MECHANISMS,
Battelle Memorial Inst Columbus Ohio Columbus Labs
R. D. Gretz. 4 Aug 66, 13p
AROD-5058:2
Grant DA-ARO (D)-31-124-G624
Availability: Published in Surface Science v6 p468-77 1967.

Descriptors: (*Nucleation, Theory), Surface properties, Diffusion, Adsorption, Kinetic theory, Statistical mechanics, Thermodynamics.

The theory of heterogenous vapor-solid nucleation is reconsidered from the viewpoint of surface diffusion constraints. It is shown that the conditions for validity of a nucleation mechanism may be phrased in terms of the relationship between mean adsorbed molecule diffusion distance to the mean separation of molecules on the substrate. Within this framework a new mechanism of nucleation is evolved. This mechanism involves random creation of nuclei which are promoted to critical nuclei by direct impingement of molecules from vapor. The predicted nucleation rate equation agrees reasonably well with Walton's data for nucleation of silver on sodium chloride. (Author)
AD-652 955 Not available from CFSTI.

THE MELTING AND PYROLYSIS OF TEFLON AND THE MELTING OF SILVER CHLORIDE AND IODINE UNDER HIGH PRESSURE,
Utah Univ Salt Lake City Inst for the Study of Rate Processes
Masaaki Tamayama, Terrell N. Andersen, and Henry Eyring. 9 Jan 67, 12p
AROD-2759:15
Grant DA-ARO (D)-31-124-G618
Availability: Published in Proceedingr of the National Academy of Sciences v57 n3 p554-61 Mar 1967.

Descriptors: (*Halocarbon plastics, Thermal properties), (*Silver compounds, Thermal properties), (*Iodine, Thermal properties), High-pressure research, Melting point, Pyrolysis, Phase diagrams, Differential thermal analysis.
Identifiers: Polytetrafluoroethylene, Silver fluoride.

The melting temperatures of Teflon (polytetrafluoroethylene) were investigated up to 30 kb and the decomposition temperatures, and the melting temperatures of silver chloride and iodine were determined up to 30 kb and 20 kb, respectively.
AD-652 957 Not available from CFSTI.

STRUCTURE OF LIQUIDS. III. AN X-RAY DIFFRACTION STUDY OF FLUID ARGON.
Doctoral thesis,
California Inst of Tech Pasadena Div of Chemistry and Chemical Engineering
P. G. Mikolaj, and C. J. Pings. 16 Feb 66, 14p
AFOSR-67-1181
Contracts AF 49 (638)-1273, Nonr-220 (40)
Availability: Published in The Journal of Chemical Physics v46 n4 p1401-11 Feb 15 1967.

Descriptors: (*Liquefied gases, *Molecular association), (*Argon, Molecular association), X-ray diffraction analysis, Density, Temperature, Pressure, Intensity, Distribution functions.

X-ray diffraction measurements were made on argon at 13 states in the general critical region on a density-temperature grid covering the range 0.280 g/cc << -RHO << 0.982 g/cc and -130C << T << -110C. Features of the intensity patterns vary rather simply with density and only weakly with temperature. Computed values of the radial distribution functions show similar dependence on T and -RHO. The first maxima in the distribution functions are at average locations of 3.90, 7.51, and 10.9 A. (Author)
AD-652 958 Not available from CFSTI.

UNPERTURBED DIMENSIONS OF POLYCATENASULPHUR AND POLYCATENASELENIUM,
Stanford Univ Calif Dept of Physics
J. A. Semlyen. 28 Oct 66, 13p
AFOSR-67-1206
Contract AF 49 (638)-1341
Availability: Published in Transactions of the Faraday Society v63 n531 pt3 p743-53 Mar 1967.

Descriptors: (*Inorganic polymers, Chemical bonds), (*Sulfur compounds, Polymers), (*Selenium compounds, Polymers), Sulfides, Selenides, Stereochemistry, Heat of formation, Molecular structure, Dipole moments, Molecular isomerism, Organic sulfur compounds.
Identifiers: Polysulfides, Polyselenides.

The evidence in support of a large barrier to internal rotation about the sulphur bond is summarized. Each bond in an unperturbed chain of polycatenasulphur may be considered to be in one of two rotational isomeric states symmetrically disposed about the trans state at phi approx. = plus or minus 90 deg. Following analysis of the chain structure, it is proposed that bond rotational states are approximately mutually independent. On this basis, the unperturbed dimensions of polycatenasulphur are calculated to be close to those expected for a freely rotating chain; so that, with a bond angle supplement, Theta, the characteristic ratio (< (r sq.)>0)/ (n (l sq.)) approx. = (1 + cos Theta). The experimental entropy of formation of cyclooctasulphur in liquid sulphur is shown to be compatible with the calculated chain dimensions. An analogous treatment of polycatenaselenium is presented; unperturbed selenium chains should be even more highly coiled than those of sulphur. The dipole moments of some n-alkyl polysulphides are calculated using the rotational isomeric state model of polymeric sulphur, and the stable conformations cf catenated sulphur and selenium derivatives, and small sulphur rings, are discussed. (Author)
AD-652 960 Not available from CFSTI.

DETECTION OF TWO INTERNAL MAGNETIC FIELDS IN Fe3 (PO4)2.4H2O,
Boston Univ Mass Dept of Physics
For primary bibliographic entry see Field 20L.
AD-652 962 Not available from CFSTI.

ABSOLUTE MEASUREMENTS OF TOTAL CROSS SECTIONS FOR THE SCATTERING OF LOW-ENERGY ELECTRONS BY ATOMIC AND MOLECULAR OXYGEN,
New York Univ N Y Dept of Physics
Gabriel Sunshine, Bertrand B. Aubrey, and Benjamin Bederson. 20 Sep 66, 11p
AROD-3521:9
Grant DA-ARO (D)-31-124-G775
Availability: Published in Physical Review v154 n1 p1-8 Feb 1967.

Descriptors: (*Electrons, Scattering), (*Oxygen, Interactions), (*Potential scattering, Probability), Molecular beams, Electron beams, Elastic scattering, Atoms, Diatomic molecules.

The atom-beam recoil technique was used to measure absolute total cross sections for the scattering of electrons by atomic and molecular oxygen at 22 energies between 0.5 and 11.3 eV, with additional data obtained up to 100 eV. In this method, a modulated electron beam cross-fires an atom beam, whose attenuation at the modulation frequency is observed. A mechanical chopper is utilized so that both the total atom beam and its scattered component can be measured by the same ac detection and amplification systems. It is therefore possible to determine absolute cross sections without requiring knowledge of the beam detection efficiency or the over-all gain of the amplification system. The angular resolution in the electron polar scattering angle ranges from about 15.6 deg. at 1 eV to 9.6 deg. at 12 eV for O, and from about 18.5 deg. at 1 eV to 11.4 deg. at 12 eV for O2. Our absolute values for O2 between 0.5 and 11.3 eV are between 10% and 20% higher than those of Bruche, while the shape of the curve agrees well. The atomic cross sections vary from about 5.3 sq. A at 0.5 eV to 8.3 sq. A at 11.3 eV, with an estimated error of 20%, except for the 0.5-eV point, which has an error of 30%. These results are in excellent agreement with semiempirical calculations of Cooper and Martin and of Robinson and Geltman, as well as with the polarized-orbitals calculation o f Temkin, and the static central field exchange approximation of Myerscough. (Author)
AD-652 963 Not available from CFSTI.

CORRELATION OF INFRARED AND INELASTIC NEUTRON SCATTERING SPECTRA,
Massachusetts Inst of Tech Cambridge Dept of Nuclear Engineering
Ashok K. Agrawal, and Sidney Yip. 17 Oct 66, 5p
AROD-7022:1
Contract DAHC04-67-C-0011
Availability: Published in Journal of Chemical Physics v46 n5 p1999-2000 Mar 1 1967.

Descriptors: (*Infrared spectroscopy, Correlation techniques), (*Neutron scattering, Correlation techniques), Nuclear spectroscopy, Liquefied gases, Methane, Incoherent scattering, Nuclear cross sections.

It is shown that in addition to its interpretive value, the rotational correlation function derived from infrared data can be used directly in the analysis of inelastic slow-neutron incoherent scattering experiments. Although certain assumptions were made in relating these two line-shape measurements, numerical results for liquid methane are presented which indicate that such an approach should be useful in correlating quantitatively optical and neutron spectra. (Author)
AD-652 966 Not available from CFSTI.

EFFECT OF SUBSTITUENTS ON THE ANISOTROPIC ELECTRON SPIN RESONANCE PARAMETERS IN COPPER ACETYLACETONATES,
Michigan State Univ East Lansing Dept of Chemistry
Henry A. Kuska, Max T. Rogers, and R. E. Drullinger. Jan 67, 10p
AROD-5118:2

Contract DA-31-124-ARO (D)-319
Availability: Published in Journal of Physical Chemistry v71 n1 p109-14 Jan 1967.

Descriptors: (*Copper compounds, *Electron spin resonance), Hyperfine structure, Valence, Atomic orbitals, Molecular orbitals, Complex compounds, Ketones.
Identifiers: Copper acetylacefonates.

In a previous paper (Kuska and Rogers, J. Chem. Phys. v43 p1744 1965) it was found that the isotropic electron spin resonance (esr) metal hyperfine parameters for a series of substituted copper acetylacetonates gave the opposite ordering of covalency from that predicted by other physical methods. The discrepancy was attributed to a contribution to the Fermi contact term of 4s character of opposite sign to the 3d contribution. Since the anisotropic esr metal hyperfine splittings can be used to calculate the covalency independently of the value of the isotropic splittings, the anisotropic esr spectra were investigated for the same systems as studied in the previous investigation. The anisotropic data do give the correct ordering for the relative covalencies for this series. However, the model of considering only the 3d and 4s contribution to the hyperfine splittings could not be extended to some of the systems examined from the literature. (Author)
AD-652 967 Not available from CFSTI.

CONTRIBUTIONS FROM THE CLOUD PHYSICS LABORATORY,
Washington Univ Seattle Dept of Atmospheric Sciences
For primary bibliographic entry see Field 4A.
AD-652 969 Not available from CFSTI.

ELECTRIC FIELD GRADIENT AT THE DEUTERON SITE IN LIQUID DC1,
Texas A and M Univ College Station
H. Boehme, and M. Eisner. 22 Nov 66, 4p
AFOSR-67-1168
Grant AF-AFOSR-173-65
Availability: Published in Physics Letters v24A n1 p59-60 Jan 2 1967.

Descriptors: (*Deuterated compounds, Electric fields), Hydrochloric acid, Nuclear magnetic resonance, Relaxation time, Deuterons, Chlorine.

The electric field gradient at the deuteron site in DC1 was estimated as 2.0 x 10 to the 17th power V/sq cm using deuteron and chlorine NMR relaxation time measurements in liquid DC1. (Author)
AD-652 992 Not available from CFSTI.

HYDRATION OF IONS IN ACETONITRILE,
Minnesota Univ Minneapolis School of Chemistry
M. K. Chantooni, Jr., and I. M. Kolthoff. 25 Nov 66, 7p
AFOSR-67-1209
Grant AF-AFOSR-28-63
Availability: Published in Journal of the American Chemical Society v89 n7 p1582-6 Mar 29 1967.

Descriptors: (*Acetonitriles, Solutions), Molecular association, Salts, Lithium compounds, Sodium compounds, Potassium compounds, Cesium compounds, Perchlorates, Iodates, Sulfonates, Nitrates, Benzoates, Salicylates, Solubility, Electrical conductance.
Identifiers: Hydration.

Equations were derived which permit the calculation of the hydration constants from the solubility product of the slightly soluble salt and the total ionic solubility in the presence of varying concentrations of water. From the experimentally determined total ionic solubility the hydration constant (s), of the following monovalent cations, Li (+), Na (+), K (+), and Cs (+), and the monovalent anions, perchlorate, periodate, methanesulfonate, nitrate, 3,5-dinitrobenzoate, salicylate, picrate, and 3,5-dinitrophenolate, were determined in acetonitrile at 25C. For K (+), Cs (+), IO4 (-), ClO4 (-), and picrate, x = 1. For the other ions x is equal to 1 and to 2. The total ionic solubility was estimated from the electrical conductance of the saturated solutions, making assumptions specified in the paper. The individual hydration constants of the 3,5-dinitrophenolate ion were determined by the above method and also by an independent spectrophotometric method. The hydration constant values by both methods were found to be in satisfactory agreement. (Author)
AD-652 994 Not available from CFSTI.

ON THE ROTATIONAL TEMPERATURE OF A SUNSPOT.
Palomar Observatory Pasadena Calif
For primary bibliographic entry see Field 3B.
AD-653 050 Not available from CFSTI.

STRUCTURE OF LIQUIDS. IV. DIRECT CORRELATION FUNCTIONS OF LIQUID ARGON,
California Inst of Tech Pasadena Div of Chemistry and Chemical Engineering
P. G. Mikolaj, and C. J. Pings. 17 Feb 66, 12p
AFOSR-67-1182
Contracts Nonr-220 (40), AF 49 (638)-1273
Research supported in part by ONR.
Availability: Published in The Journal of Chemical Physics v46 n4 p1412-20 Feb 15 1967.

Descriptors: (*Liquefied gases, *Molecular association), (*Argon, Molecular association), Statistical functions, Atomic properties, X-ray diffraction analysis, Integral equations, Liquids.

Recently acquired x-ray diffraction data from 13 states of fluid argon (see AD-652 958) were used to compute the direct correlation function, C (r). This function is found to be definitely short range, particularly when compared to the conventional radial distribution function at the same state. Using experimental data and knowledge of the radial distribution function, estimates were also made of the state-dependent behavior of C (r) for radii less than the atomic radius. The median location of the first zero of C (r) is r-o = 3.39 plus or minus 0.06 A; this value tends to increase with increasing temperature and with decreasing density. The median location of the maximum in C (r) is r-max = 3.84 plus or minus 0.07 A; this value shows a slight but inconclusive tendency to increase with increasing temperature and to decrease with increasing density. The height of the single maximum varies from 0.8 to 1.3 over the range studied; while there was no observable temperature effect, the peak height tends to decrease as the density is increased. The computed direct correlation functions were used in conjunction with previously calculated radial distribution functions in order to test fundamental hypotheses underlying the derivations of the Percus-Yevick and convolute hypernetted-chain integral equations, with the conclusion that these equations have systematic density-dependent defects. The intermolecular potential function was estimated by zero density extrapolation of a potential computed from the PY equation with results in good agreement with currently accepted values for the pair potential. (Author)
AD-653 051 Not available from CFSTI.

THE REFLECTANCE OF THE INTERMETALLIC COMPOUNDS NiAl AND CoAl,
Northwestern Univ Evanston Ill Dept of Materials Science
For primary bibliographic entry see Field 20F.
AD-653 059 Not available from CFSTI.

DIELECTRIC CONSTANT OF WATER AND SUPERCOOLED WATER: EXPERIMENTAL DETERMINATIONS.
Research rept., 1963-1966,
Navy Electronics Lab San Diego Calif
E. W. Rusche. 1 Feb 67, 88p Rept no. NEL-1434
Doctoral thesis.

Descriptors: (*Water, *Dielectric properties), (*Molecular association, Water), Supercooling, Hysteresis, Molecular structure, Theory, Capacitance.

The static dielectric constant of liquid water, epsilon-H2O, was measured at 59 temperatures over the range -5.13 to 25.08C. Values of epsilon-H2O were obtained with greater accuracy than has been achieved previously. No abrupt changes occurred in the dielectric constant over the temperature range studied. The results were used in an examination of two well known theories of the molecular structure of water. The experimental results are accurately described by the equation epsilon-H2O = 88.083 - 0.4042T + (0.00092) (T sq), where T is temperature in degrees centigrade. (Author)
AD-653 061 HC$3.00 MF$0.65

STUDY OF FUNDAMENTAL REQUIREMENTS FOR HIGH BRIGHTNESS RAMAN LASER SOURCES.
Semiannual Technical rept., 1 Oct 66-31 Mar 67,
Hughes Research Labs Malibu Calif
F. J. McClung. May 67, 27p
Contract N00014-67-C-0206, ARPA Order-306

Descriptors: (*Lasers, *Raman spectroscopy), Scattering, Brightness, Hydrogen, Liquids, Nonlinear systems, Gas lasers, Refractive index, Mathematical analysis, Optics, Focusing.

The study is of SRS in liquids. The production of high brightness Raman devices is possible in liquids; however, the brightness gains over existing laser devices does not appear to be very large. We must exercise care in selection of the material to achieve any semblance of gain. The case for gases is much better. Many unexplained processes occur in H2 and possibly other gases as well. The brightness gains that could be produced have not yet been determined, and the main effort is now concentrated on this problem. We are also investigating the strange behavior of H2 in the usual SRS experiments. (Author)
AD-653 106 HC$3.00 MF$0.65

SOME FRICTIONAL PROPERTIES OF THIN WATER FILMS.
Special rept.,
Snow Ice and Permafrost Research Establishment Wilmette Ill
H. H. G. Jellinek. Jun 60, 17p Rept no. SIPRE-SR-37

Descriptors: (*Water, Films), (*Skin friction, Water), Optical instruments, Thickness, Measurement, Optical materials, Temperature, Shear stresses, Physical properties, Surface properties.

An optical method has been established to measure film thickness down to about 0.2 micron and a shear apparatus has been constructed for the investigation of frictional properties of water films sandwiched between optically flat glass plates. Friction has been studied as a function of film thickness, rate of shearing and temperature. It rises very rapidly from very low values to high values when the film becomes 1 micron or thinner. The stress is inversely proportional to the film thickness and only slightly dependent on rate of shear, decreasing with increasing shear. The phenomenon is clearly that of dry friction due to particulate matter and some remaining asperities in the glass surface. (Author)
AD-653 132 HC$3.00 MF$0.65

GASEOUS TERNARY COMPOUNDS OF THE ALKALI METALS.
Little (Arthur D) Inc Cambridge Mass
For primary bibliographic entry see Field 7B.
AD-653 163 HC$3.00 MF$0.65

THE INFRARED ABSORPTION BANDS OF OZONE,
Ohio State Univ Research Foundation Columbus
For primary bibliographic entry see Field 4A.
AD-653 195 HC$3.00 MF$0.65

REFLECTION AND POLARIZATION PROPERTIES OF POWDER MATERIALS.
Technical information series,
General Electric Co Philadelphia Pa Missile and Space Div
H. H. Blau, Jr., E. L. Gray, and G. M. B. Bouricius. Jun 67, 30p Rept no. 67SD29

Descriptors: (*Powders, *Polarization), Reflection, Silicon carbides, Aluminum compounds, Oxides, Albedo, Illumination, Tables.

Directional radiance factors and polarization are presented for pure silicon carbide powder with an average albedo of .15 over a size range from 8 to 86 microns, pure aluminum oxide powder with average albedo about .85 over a size range from 0.1 to 86 microns, and for a mixture of one part silicon carbide to six parts aluminum oxide with average albedo of about .40 over a size range from 5 to 86 microns. (Author)
AD-653 197 HC$3.00 MF$0.65

ROLE OF SINGLET EXCITED STATES OF MOLECULAR OXYGEN IN THE QUENCHING OF ORGANIC TRIPLET STATES,
California Univ Riverside Dept of Chemistry
Kenji Kawoka, A. U. Khan, and David R. Kearns. 26 Sep 66, 16p
AROD-3896:7
Grants DA-ARO (D)-31-124-G405, DA-ARO (D)-31-124-G511
Availability: Published in Journal of Chemical Physics v46 n5 p1842-53 Mar 1 1967.

Descriptors: (*Molecular energy levels, *Quenching (Inhibition)), (*Fluorescence, Quenching (Inhibition)), (*Oxygen, Molecular energy levels), Excitation, Oxidation-reduction reactions, Magnetic fields, Electron transitionr, Molecular orbitals, Band spectrum, Intensity.
Identifiers: Franck-Condon principle.

The quenching of triplet-state molecules by molecular oxygen is examined theoretically. Two different quenching processes are considered: namely, (i) quenching by transfer of electronic excitation energy from the triplet state of the donor molecule to oxygen, resulting in a ground-state donor molecule and an electronically excited singlet-state oxygen molecule; and (ii) quenching by enhancement of intersystem crossing in the donor molecule, resulting in a vibrationally excited donor molecule in its ground electronic state and a ground-state molecule. The relative importance of these two quenching processes is determined almost entirely by Franck-Condon factors, rather than by electronic factors. From the analysis it is concluded that quenching by transfer of electronic excitation energy from the triplet-state molecule to oxygen is usually 100-1000 times faster than quenching by enhanced intersystem crossing. Exchange interactions appear to be less important in promoting the radiationless transitions than do interactions involving charge-transfer virtual states. The absolute value of the quenching rate calculated for the energy transfer process satisfactorily accounts for the experimental observations on the oxygen quenching of triplet-state molecules in solution. These theoretical results give strong support to the previous suggestion that quenching of triplet-state molecules by oxygen leads to the production of electronically excited singlet-state ((1)Sigma-g (+)or (1)Delta-g) oxygen molecules. (Author)
AD-653 228 Not available from CFSTI.

ELECTROCHEMISTRY IN DIMETHYL SULFOXIDE,
Tyco Labs Inc Waltham Mass
James N. Butler. 14 May 66, 32p Rept no. Scientific-2
AFCRL-67-0331
Contract AF 19 (628)-5525
Availability: Published in Journal of Electroanalytical and Interfacial Chemistry v14 p89-116 May 1967.

Descriptors: (*Sulfoxides, *Electrochemistry), Reviews, Organic solvents, Purification, Solubility, Electrical conductance, Polarographic analysis, Gas analysis, Quinones, Electrodes, Lithium, Electrical double layer, Oxidation-reduction reactions, Electrolytes, Physical properties.
Identifiers: Dimethyl sulfoxide.

The literature on electrochemistry in dimethyl sulfoxide available at the beginning of 1966 is reviewed. Tables of physical properties, solubilities, conductance, and polarographic and potentiometric data are given. The purification of DMSO; conductance studies; polarography of cations, anions, and gases; the reactions of quinones; the lithium electrode; the electrical double layer; reference electrodes; potentiometric studies; and the activity coefficients of electrolytes in DMSO are discussed. (Author)
AD-653 238 Not available from CFSTI.

SUBSTITUENT EFFECTS. VI. THEORETICAL INTERPRETATION OF ADDITIVITY RULES OF NMR USING MCWENNY GROUP FUNCTIONS,
Stevens Inst of Tech Hoboken N J Dept of Chemistry and Chemical Engineering
Theodore Vladimiroff, and Edmund R. Malinowski. 12 May 66, 16p
AROD-3930:9
Contract DA-31-124-ARO (D)-90
See also AD-638 337.
Availability: Published in Journal of Chemical Physics, v46 n5 p1830-41, 1 Mar 1967.

Descriptors: (*Nuclear magnetic resonance, Theory), Wave functions, Groups (Mathematics), Functions, Hamiltonian, Line spectrum, Substitution reactions, Approximation (Mathematics), Molecular isomerism, Operators (Mathematics), Nuclear spins, Perturbation theory.

McWeeny group functions, in conjunction with the popular Ramsey formulation, are used to theoretically account for the additive influence of substituents observed in NMR spectra. In this treatment the group wavefunctions are assumed to perturb one another only to first order. This approach is applied to chemical shifts and coupling constants involving various types of nuclei. In general, the substituent effect is found to be pairwise additive. If the substituent is far removed from the nuclei in question then the pairwise rule reduces to direct additivity. For a local operator, such as the Fermi contact term in spin coupling, the effects of substituents are directly additive even though the substituents are bonded to one of the nuclei in question. If the group wavefunctions act as a large perturbation on one another then the second-order terms cannot be neglected, and the simple direct and pairwise additivity rules fail. Existing data and new data are discussed in terms of the above theoretical treatment. (Author)
AD-653 246 Not available from CFSTI.

DETACHMENT OF ELECTRONS FROM H (-) BY ELECTRON IMPACT,
Joint Inst for Lab Astrophysics Boulder Colo
For primary bibliographic entry see Field 3B.
AD-653 247 Not available from CFSTI.

RELATIVISTIC STATISTICAL MECHANICS AND BLACKBODY RADIATION,
Rochester Univ N Y Dept of Physics and Astronomy
Joseph H. Eberly, and Adam Kujawski. 15 Sep 66, 11p
AFOSR-67-1279
Grant AF-AFOSR-237-65
Availability: Published in Physical Review v155 n1 p10-9 Mar 5 1967.

Descriptors: (*Statistical mechanics, *Blackbody radiation), Field theory, Entropy, Statistical functions, Temperature, Energy, Thermodynamics, Density.

A manifestly Lorentz-invariant generalization of the Gibb's canonical density operator is derived for the free fields of quantum electrodynamics from the maximum-entropy principle. Known results for the energy density, entropy, and other thermodynamic functions of blackbody radiation are very simply rederived. Use of the invariant density operator makes it clear that, contrary to recent assertions of Ott and others, it is not necessarily most natural to assume that temperature transforms like an energy. What is more to the point, it is shown that the concept of temperature in a moving system can be eliminated altogether if desired. Temperature may be conveniently considered as a purely rest-frame concept. The invariant density operator is then used to investigate the second-order two-point space-time correlation functions of the blackbody radiation field. The recent results of Mehta and Wolf and others are generalized to an arbitrary uniformly moving coordinate system, and the most interesting cases of pure temporal and spatial coherence are presented graphically. Two examples are given in which a moving observer measures a higher degree of coherence than he would in the rest system. Some remarks are made concerning the Gaussian nature of the phase-space distribution function, and the consequences for higher-order correlation functions in a moving frame are discussed briefly. (Author)
AD-653 256 Not available from CFSTI.

THE REVERSIBLE THERMAL DECOMPOSITION OF TRIPHENYLMETHYLPEROXY RADICAL TO TRIPHENYLMETHYL RADICAL AND OXYGEN,
Georgia Univ Athens Dept of Chemistry
For primary bibliographic entry see Field 7C.
AD-653 259 Not available from CFSTI.

LEAST SQUARES ANALYSIS WITH A DYNAMIC MODEL.
Wisconsin Univ Madison Dept of Statistics
For primary bibliographic entry see Field 12A.
AD-653 265 HC$3.00 MF$0.65

FINE STRUCTURE OF n=4 LEVELS OF (He4)(+),
Yale Univ New Haven Conn Dept of Physics
K. R. Lea, M. Leventhal, and W. E. Lamb, Jr. 27 Dec 65, 5p
AFOSR-67-1221
Grant AF-AFOSR-249-65
Availability: Published in Physical Review Letters v16 n5 p163-5 Jan 31 1966.

Descriptors: (*Helium, *Microwave spectroscopy), (*Atomic energy levels, Helium), Electron transitions, Hyperfine structure, Ions, Zeeman effect, Field theory.

Microwave resonances in the n=4 levels of He (+) were observed, and a preliminary report is given of measurements which advance the accuracy to which the two intervals 4 (2)S1/2-4 (2)P1/2 (S) and 4 (2)P3/2-4 (2)P1/2 (Delta-E) are known experimentally. No significant discrepancies between the theoretical and experimental values for the n=4 He (+) level shift and fine structure were apparent.
AD-653 299 Not available from CFSTI.

MEASUREMENT OF THE QUANTUM-ELECTRODYNAMIC LEVEL SHIFT IN THE n=3 STATE OF (He4)(+).
Yale Univ New Haven Conn Dept of Physics
M. Leventhal, K. R. Lea, and W. E. Lamb, Jr. 2 Dec 65, 4p
AFOSR-67-1222
Grant AF-AFOSR-249-65
Availability: Published in Physical Review Letters v15 n26 p1013-5 Dec 27 1965.

Descriptors: (*Helium, *Microwave spectroscopy), (*Atomic energy levels, Helium), Electron transitions, Hyperfine structure, Ions, Zeeman effect, Field theory.

A report is given of the first observation of microwave resonance between n=3 states of He (+), and of the results of an initial low-precision measurement of the level shift S=E (3 (2)S1/2-E (3 (2)P1/2). No large discrepancy with the predictions of the theory of quantum electrodynamics are evident.
AD-653 300 Not available from CFSTI.

LATTICE PARA LETERS OF IRON-RICH IRON-GALLIUM ALLOYS,
California Univ San Diego La Jolla Dept of Physics
H. L. Luo. 6 Sep 66, 4p
AFOSR-67-1224
Grant AF-AFOSR-631-64
Availability: Published in Transactions of the Metallurgical Society of AIME v239 p119-20 Jan 1967.

Descriptors: (*Crystal lattices, *Iron alloys), (*Gallium alloys, Crystal lattices), Solubility, Crystal structure, Solid solutions, Quenching (Cooling), X-ray diffraction annlysis, Intensity, High-temperature research, Bismuth, Cesium compounds, Chlorides, Atomic properties, Heat-resistant metals + alloys, Phase studies, Cobalt, Ferromagnetic materials, Tests.

Systematic investigations of theFe-Ga system have been reported only recently. The maximum solid solubility of gallium in alpha-Fe is nearly 50 at. pct. at 900C. However, it was not evident that the alpha-Fe solid solution could be retained successfully beyond 17.38 at. pct Ga by solid-state quenching. The present investigation reports the retention of alpha-Fe solid solution at 50 at. pct Ga by quenching from the liquid. An ordered phase of CsCl-type (B2) structure was observed between 34 difference 50 at. pct Ga. Since it was considered very probable that the CsCl structure would occur at high temperatures, alloy filings were also quenched by the conventional quenching technique. In addition to the CsCl phase, a second ordered phase of BiF3-type (DO3) structure was found in the range 25 difference 30 at. pct Ga. (Author)
AD-653 304 Not available from CFSTI.

POLARIZATION OF LIGHT FROM e (-)He COLLISIONS.
Revised ed.,
Massachusetts Univ Amherst
Edward A. Seltysik, Albert Y. Feurnier, and Robert L. Gray. 8 Sep 66, 6p
AFOSR-67-1218
Grant AF-AFOSR-218-63
Revision of manuscript submitted 16 May 66.

Descriptors: (*Helium, *Electron bombardment), (*Electron transitions, Polarization), Atomic energy levels, Excitation, Emissivity, Electron beams, Magnetic fields.

The polarization of light resulting from the excitation of helium by electron impact was measured as a function of electron energy. Results are reported in the energy threshold region for the following transitions: 3 (1)P to 2 (1)S (wavelength = 5016A), 3 (3)P to 2 (3)S (wavelength = 3889A), and 4 (1)D to 2 (1)P (wavelength = 4922A). The results reported are in substantial agreement with the results previously reported by McFarland. Also, no dependence of the polarization on the magnetic field parallel to the electron beam was observed. (Author)
AD-653 307 Not available from CFSTI.

TRANSPORT PROCESSES IN LOW MELTING SALTS: THALLOUS NITRATE.
Technical rept.,
Rensselaer Polytechnic Inst Troy N Y Dept of Chemistry
A. Timidei, and G. J. Janz. May 67, 20p Rept no. TR-32
Contract Nonr-591 (10)
Availability: Published in Journal of Physical Chemistry.

Descriptors: (*Thallium compounds, Transport properties), (*Nitrates, Transport properties), Salts, Electrical conductance, Viscosity, Density, Heat of activation, Ionic current, Spectroscopy, Molecular association.
Identifiers: Thallium nitrates, Fused salts.

The electrical conductance, viscosity, and density of molten TlN03 are reported over the temperature range 210-281C. The energies of activation E-lambda and E-eta for ionic conductance and viscous flow are, respectively, 3.35 and 3.65 kcal/equiv. These results are examined relaative to best-values for chlorides and nitrates and relative to recent spectral data. The near equivalency of the values of E-lambda and E-eta in the nitrate series, and the spectral data are in accord with the viewpoint of cooperative interactions, resulting in nearly equivalent configurational changes, dominating the transport processes in such structured but highly ionic melts. (Author)
AD-653 313 Not available from CFSTI.

A NEW METHOD OF OBTAINING THE WELL DEPTH FOR WEAK INTERMOLECULAR POTENTIALS.
Summary technical rept.,
Midwest Research Inst Kansas City Mo
Thomas A. Milne, and Frank T. Greene. 12 Jun 67, 11p
Contract Nonr-3599 (00)

Descriptors: (*Molecular association, *Mass spectroscopy), (*Helium group gases, Heat of reaction), Electrostatics, Measurement, Vapor pressure, Atomic energy levels, Argon, Molecular beams, Thermochemistry.

A straightforward mass spectrometic determination of the dimerization heat of rare gases is shown to be feasible. A method of data reduction is proposed which appears to yield a depth of the potential well independent of prior choice of the form of the potential function. Errors in the measurements are discussed. (Author)
AD-653 314 HC$3.00 MF$0.65

HARTREE-FOCK MULTIPLET STRENGTHS FOR K I, Ca II, AND Sc III,
National Bureau of Standards Washington D C Inst for Basic Standards
A. W. Weiss. 14 Dec 66, 6p
Availability: Published in Journal of Research of the National Bureau of Standards v71A n2 p157-62 Mar/Apr 1967 (Paper-71A2-447).

Descriptors: (*Atomic energy levels, *Hartree-Fock approximation), (*Potassium, Wave functions), (*Calcium, Wave functions), (*Scandium, Wave functions), Electron transitions, Ground state, Atomic orbitals, Ions, Line spectrum.
Identifiers: Defender project.

Analytical approximations to Hartree-Fock wavefunctions were computed for the 4s, 4p, and 3d states of K I, Ca II, and Sc III. Multiplet strengths for the 4s-4p and 4p-3d transitions in these ions are also computed. Examination of the results indicate that relaxation of the core in the field of the series electron accounts for a large portion of the core polarization effect, at least for the 3d level. Serious cancellation is found to invalidate the dipole velocity results of the 4p-3d transition in Ca II. (Author)
AD-653 350 Not available from CFSTI.

OSCILLATOR STRENGTHS FOR THE HELIUM ISOELECTRONIC SEQUENCE,
National Bureau of Standards Washington D C Inst for Basic Standards
A. W. Weiss. 16 Oct 66, 6p
Availability: Published in Journal of Research of the National Bureau of Standards v71A n2 p163-8 Mar/Apr 1967 (Paper 71A2-448).

Descriptors: (*Helium, Wave functions), (*Atomic energy levels, *Wave functions), Electron transitions, Ions, Lithium, Beryllium, Boron, Carbon, Nitrogen, Oxygen, Fluorine, Neon, Excitation.
Identifiers: Defender project.

Variational wavefunctions were computed for the 1 (1)S, 2 (1,3)S, 2 (1,3)P, 3 (1,3)P, and 3 (1,3)D terms of ions in the helium isoelectronic sequence from He through Ne (+8). The trial functions are Hylleraas type expansions, explicitly involving r12, and with expansion lengths of around 50 terms, differing slightly for the different states. Oscillator strengths have been computed for all the allowed transitions by both the dipole length and velocity formulas. Agreement between these forms, comparisons with very accurate data for neutral helium, and the accuracy of the computed energies all point to considerably reliability of the results for the entire sequence, probably around 5 percent, if not better. (Author)
AD-653 351 Not available from CFSTI.

SIMPLIFICATION AND SYMMETRIZATION OF THE FIXMAN RELATION FOR VISCOSITY OF CRITICAL MIXTURES,
California Inst of Tech Pasadena Div of Chemistry and Chemical Engineering
C. J. Pings. 14 Sep 66, 4p
AFOSR-67-1261
Contract AF 49 (638)-1273
Availability: Published in The Journal of Chemical Physics v46 n5 p2013-4 Mar 1 1967.

Descriptors: (*Viscosity, Equations), Transport properties, Diffusion, Mixtures, Interactions, Chemical reactions, Mathematical prediction, Transition temperature.
Identifiers: Critical mixtures.

The Fixman theory for excess viscosity near the consolute point of binary systems yields a result which is apparently not invariant upon the interchange of the role of the two components. The present work involves the rederivation of the Fixman result using a symmetric diffusion coefficient and imposing certain self-consistent approximations in the derivation. The resulting expression for the viscosity excess is symmetric and bounded at both composition extremes. The result is combined with an expression of the Flory-Huggins type describing the dependence of the chemical activity upon composition. The resulting expression predicts a singularity in the viscosity at the critical point with dependence on T - Tc of an inverse power of approximately 0.5 to 0.4. (Author)
AD-653 353 Not available from CFSTI.

CHEMISTRY OF POSITIVE IONS. VI. POSITIVE-ION CHEMISTRY IN SOLID METHANE,
California Univ Los Angeles
For primary bibliographic entry see Field 7E.
A D-653 381 Not available from CFSTI.

MELTING POINTS AT HIGH COMPRESSIONS FROM ZERO-COMPRESSION PROPERTIES THROUGH THE KENNEDY RELATION,

California Univ Los Angeles Dept of Chemistry
For primary bibliographic entry see Field 20M.
AD-653 382 Not available from CFSTI.

H-1 AND F-19 NUCLEAR MAGNETIC RESONANCE SPECTRA OF THE ADDUCT BF3.H2O,
Mcmaster Univ Hamilton (Ontario) Dept of Chemistry
R. J. Gillespie, and J. S. Hartman. 10 Nov 66, 7p
AFOSR-67-1270
Grant AF-AFOSR-1127-66
Availability: Published in Canadian Journal of Chemistry v45 p859-63 1967.

Descriptors: (*Boron compounds, *Nuclear magnetic resonance), (*Fluorides, Nuclear magnetic resonance), Hydrates, Absorption spectrum, Molecular association, Complex compounds, Concentration (Chemistry), Solutions, Canada.
Identifiers: Boron fluoride, Charge-transfer complexes.

It is shown by low-temperature H-1 and F-19 nuclear magnetic resonance (n.m.r.) spectroscopy that boron trifluoride monohydrate is formed in dilute solutions in acetone containing both water and BF3. In solutions in which (H2O concentration) < (BF3 concentration), proton-fluorine coupling is observed which definitely establishes that in acetone solution at low temperatures the monohydrate is the simple donor-acceptor complex H2O to BF3. In solutions in which (H2O concentration) > (BF3 concentration), no proton-fluorine coupling was observed because of rapid proton exchange. (Author)
AD-653 389 Not available from CFSTI.

A MATHEMATICAL TREATMENT OF NONEQUILIBRIUM CHROMATOGRAPHY,
National Research Council of Canada Ottawa (Ontario) Div of Applied Chemistry
Hideo Yamazaki. 12 Sep 66, 8p
NRC-9413
Availability: Published in Journal of Chromatography v27 p14-9 1967.

Descriptors: (*Gas chromatography, Mathematical analysis), Statistical analysis, Distribution functions, Adsorption, Statistical distributions, Partial differential equations, Transformations (Mathematics), Canada.

A nonequilibrium chromatographic process was analyzed mathematically using Mellin transforms. The peak characteristics, i.e. retention time, peak width, peak asymmetry and deviation from the Gaussian distribution are expressed in terms of the mean, variance, skewness and excess of the distribution function. The rates of the desorption and adsorption processes can be evaluated from the statistical quantities. The theory was applied to the adsorption on multiple sites. (Author)
AD-653 392 Not available from CFSTI.

SURFACE-ENERGY TENSORS FOR ELLIPSOIDS.
Chicago Univ Ill Dept of Physics
For primary bibliographic entry see Field 12A.
AD-653 393 Not available from CFSTI.

EVIDENCE FOR THE FORMATION AND UNIMOLECULAR DECOMPOSITION OF TRIMETHYLENE BIRADICAL INTERMEDIATES IN THE REACTION OF TRIPLET METHYLENE WITH OLEFINS,
National Research Council of Canada Ottawa (Ontario) Div of Applied Chemistry
R. J. Cvetanovic, H. E. Avery, and R. S. Irwin.
25 Nov 66, 3p
NRC-9419
Availability: Published in The Journal of Chemical Physics v46 n5 p1993-4 Mar 1967.

Descriptors: (*Free radicals, Chemical properties), Alkenes, Ethylenes, Molecular energy levels, Synthesis (Chemistry), Decomposition, Tracer studies, Cyclopropanes, Canada.
Identifiers: Trimethylene radicals.

Experimental evidence was obtained which proves that trimethylene biradical intermediate is formed when triplet methylene adds to ethylene (and presumably to olefins in general). With singlet methylene, on the other hand, the over-all behavior is quite different. It was not possible to establish in the case of singlet methylene whether a trimethylene intermediate is involved or a concerted addition occurs.
AD-653 394 Not available from CFSTI.

EINIGE BEMERKUNGEN ZU EINER ARBEIT VON W. KOSTER UND H.-P. RAVE UBER 'LEITFAHIGKEIT UND HALLKONSTANTE' (Some Remarks on a Paper by W. Koster and H.-P. Rave 'Conductivity and Hall Constant'),
National Research Council of Canada Ottawa (Ontario) Div of Applied Chemistry
For primary bibliographic entry see Field 20C.
AD-653 397 Not available from CFSTI.

RATES OF ADDITION OF METHYL RADICALS TO OLEFINS IN THE GAS PHASE,
National Research Council of Canada Ottawa (Ontario) Div of Applied Chemistry
R. J. Cvetanovic, and R. S. Irwin. 14 Nov 66, 10p
NRC-9440
Availability: Published in Journal of Chemical Physics v46 n5 p1694-1702 Mar 1 1967.

Descriptors: (*Free radicals, Addition reactionr), (*Alkenes, Addition reactions), Gases, Reaction kinetics, Heat of activation, Carbon monoxide, Methane, Gas analysis, Ethylenes, Propenes, Butadienes, Canada.
Identifiers: Methylene radicals, Butenes.

A technique was developed and used to measure relative rates of reaction of methyl radicals with a number of olefins in the gas phase at 80, 130, and 180C. The rate constants, activation energies, and pre-exponential factors were determined. (Author)
AD-653 399 Not available from CFSTI.

DISSOCIATION PRESSURES AND PHASE EQUILIBRIA OF THE PENTAFLUOROANISOLE-BORON TRIFLUORIDE COMPLEX SYSTEM,
Oak Ridge Gaseous Diffusion Plant, Tenn.
C. G. Jones. 3 Apr 67, 218p
Contract W-7405-eng-26

Descriptors: (*Boron compounds, *Fluorides), Dissociation, Phase studies, Melting point, Isotope separation, Costs, Eutectics, Solutions, Benzenes, Complex compounds.

For abstract, see NSA 21 12.
K-1689 HC$3.00 MF$0.65

NITROGEN TETROXIDE DISPOSAL UNIT COMBUSTION PRODUCTS.
National Aeronautics and Space Administration. Manned Spacecraft Center, Houston, Tex.
For primary bibliographic entry see Field 21B.
For abstract, see STAR 05 14.
N67-26544 HC$3.00 MF$0.65

RESEARCH INVESTIGATION DIRECTED TOWARD EXTENDING THE USEFUL RANGE OF THE ELECTROMAGNETIC SPECTRUM PROGRESS REPORT, 1 MAY - 31 OCT. 1966.
Columbia Univ., New York. Columbia Radiation Lab.
R. Novick. 31 Oct 66, 116p NASA-CR-84299.
PR-14
Grants NSG-360, NSG-442

Descriptors: *Nuclear physics, *Radio astronomy, *Research project, *Solid state physics, Astronomy, Atom, Collision, Energy level, Ion, Molecule, Nuclear, Physics, Project, Radio, Research, Resonance, Solid state, Spectroscopy, X-ray.

For abstract, see STAR 05 14.
N67-26616 HC$3.00 MF$0.65

PROPERTIES OF NONAQUEOUS ELECTROLYTES QUARTERLY REPORT, 20 DEC. 1966 - 19 MAR. 1967.
Rocketdyne, Canoga Park, Calif.
J. N. Foster, J. F. Hon, R. Keller, and J. M. Sullivan. 19 Apr 67, 90p NASA-CR-72065, R-6754-3
Contract NAS3-8521

Descriptors: *Electrolyte, *Nuclear magnetic resonance, *Physical property, Acetonitrile, Ammonium, Carbonate, Chromatography, Conductance, Dimethyl, Fluoride, Formamide, Magnetic, Methyl, Nuclear, Phase, Phosphate, Physical, Property, Propylene, Resonance, Solubility, Solvent, Vapor, Viscosity.

For abstract, see STAR 05 14.
N67-26628 HC$3.00 MF$0.65

HYDRAZINE-NITRATE-HYDRAZINE AS A MONERGOLIC PROPELLANT, PART II.
Deutsche Versuchsanstalt Fur Luft- Und Raumfahrt, Stuttgart (West Germany). Institut Fur Raketentreibstoffe.
For primary bibliographic entry see Field 21I.
For abstract, see STAR 05 14.
N67-27130 HC$3.00 MF$0.65

POSSIBLE EXTENSIONS AND APPLICATIONS OF THE COLLECTIVE MODEL OF THE HYDROGEN BOND.
Istituto Superiore Di Sanita, Rome (Italy). Laboratori Di Fisica.
For primary bibliographic entry see Field 6A.
For abstract, see STAR 05 14.
N67-27135 HC$3.00 MF$0.65

A FLOW CALORIMETER FOR DETERMINING THE MOLECULAR HEAT OF HIGH-BOILER LIQUID VAPORS.
Ein Stroemungskalorimeter Zur Bestimmung Der Molwaermen Von Daempfen Hochsiedender Fluessigkeiten
European Atomic Energy Community, Ispra (Italy). Hauptabteilung Engineering - Waermeuebertragung.
F. W. Reiter. Mar 67, 30p EUR-3278.D
in German, English Summary

Descriptors: *Calorimetry, *Flow measurement, *Vaporization heat, Benzene, Boiling, Chemistry, Diphenyl, Flow, Heat, Liquid, Measurement, Mol, Point, Pressure, Stream, Terphenyl, Vapor, Vaporization.

For abstract, see STAR 05 14.
N67-27139 HC$3.00 MF$0.65

DIFFUSION OF FISSION PRODUCTS IN OVERLAPPING CHEMICAL REACTION. THERMODYNAMIC CALCULATIONS.
Diffusion Von Spaltprodukten Bei Ueberlagerter Chemischer Reaktion. Thermodynamische Berechnungen
Kernforschungsanlage, Juelich (West Germany). Institute Fuer Chemische Technologie.
H. Kirchner, and M. Laser. Feb 67, 20p EUR-3272.D
Contract EURATOM-003-63-1 RGAD
in German, English Summary

Descriptors: *Fission product, *Formation heat, *Graphite, Alkali, Calculation, Carbide, Chemistry, Diffusion, Earth, Fission, Formation, Gas, Heat, Lanthanide, Matrix, Nuclear, Phase, Product, Thermodynamics.

For abstract, see STAR 05 14.
N67-27140 HC$3.00 MF$0.65

ANALYSIS OF ERROR GROWTH AND STABILIT 0 FOR THE NUMERICAL INTEGRATION OF THE EQUATIONS OF CHEMICAL KINETICS.
General Applied Science Labs., Inc., Westbury, N. Y.
D. E. Magnus, and H. S. Schechter. 1964, 71p
NASA-CR-66371
Contract NAS1-5046

Descriptors: *Chemical kinetics, *Differential equation, *Numerical integration, *Truncation error, Analysis, Chemical, Differential, Equation, Error, Growth, Integration, Kinetics, Linearization, Numerical, Procedure, Residual, Stability, System, Truncation.

For abstract, see STAR 05 14.
N67-27231 HC$3.00 MF$0.65

THE USE OF SELF-CALIBRATING CATALYTIC PROBES TO MEASURE FREE-STREAM ATOM CONCENTRATION IN A HYPERSONIC FLOW.
Toronto Univ. (Ontario).
For primary bibliographic entry see Field 1A.
For abstract, see STAR 05 14.
N67-27268 HC$3.00 MF$0.65

OPACITY OF HOT, HIGHLY COMPRESSED HYDROGEN FINAL REPORT.
Naval Ordnance Lab., White Oak, Md.
For primary bibliographic entry see Field 14B.
For abstract, see STAR 05 14.
N67-27303 HC$3.00 MF$0.65

INVESTIGATION OF THE CATALYTIC INTERACTION OF HYDROGEN CHLORIDE AND METHANOL. PART II - KINETICS OF DEHYDRATION OF METHANOL AND HYDROCHLORINATION OF DIMETHYL ETHER ON CATAL 0STS USED FOR VAPOR-PHASE SYNTHESIS OF METHYL CHLORIDE.
National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
For primary bibliographic entry see Field 7C.
For abstract, see STAR 05 14.
N67-27417 HC$3.00 MF$0.65

DEVELOPMENT OF CATHODIC ELECTROCATALYSTS FOR USE IN LOW TEMPERATURE 2HZ/ O2 FUEL CELLS WITH AN ALKAEINE ELECTROLYTE QUARTERLY REPORT, 1 JAN. - 31 MAR. 1967.
Tyco Labs., Inc., Waltham, Mass.
J. Giner, and J. Parry. 31 Mar 67, 73p NASA-CR-84440, QR-7
Contract NASW-1233

Descriptors: *Carbide, *Cobalt alloy, *Electrocatalyst, *Fuel cell, *Hydrogen peroxide, *Nickel alloy, Alkali, Alloy, Cell, Cobalt, Electrode, Electrolyte, Fuel, Hydrogen, Low temperature, Nickel, Oxygen, Peroxide, Reduction.

For abstract, see STAR 05 14.
N67-27431 HC$3.00 MF$0.65

A STUDY OF GAS SOLUBILITIES AND TRANSPORT PROPERTIES IN FUEL CELL ELECTROLYTES SEMIANNUAL REPORT, 1 SEP. 1966 - 28 FEB. 1967.
Florida Univ., Gainesville. College of Engineering.
R. D. Walker, Jr., 29 Mar 67, 49p NASA-CR-84432, SAR-3
Contract NGR-10-005-022

Descriptors: *Electrolyte, *Fuel cell, *Solubility, *Transport property, Cell, Density, Diffusion, Fuel, Gas, Hydroxide, Measurement, Oxygen, Potassium, Pressure, Property, Transport, Vapor.

For abstract, see STAR 05 14.
N67-27439 HC$3.00 MF$0.65

METHODS FOR PREVENTION OF HEATING OF AN ABSORBENT BY INFRARED RADIATION IN STUDIES ON THE SPECTRA OF ABSORBED MOLECULES.
Metody Isklyucheniya Nagrevaniya Adsorbenta Infrakrasnym Izlucheniyem Pri Issledovanii Spektrov Absorbirovannykh Molekul
National Aeronautics and Space Administration, Washington, D. C.
G. A. Galkin, A. V. Kiselev, and V. I. Lygin. Jun 67, 5p NASA-TT-F-11006
Transl. Into English From Zh. Fiz. Khim. (Moscow), V. 41, No. 3, 1967 P 740-742

Descriptors: *Heat resistance, *Infrared radiation, *Molecular spectrum, Adsorbent, Beam, Cell, Heat, Infrared, Interaction, Internal, Light, Molecular, Monochromatic, Radiation, Resistance, Resolver, Spectrometer, Spectrum, Study.

For abstract, see STAR 05 14.
N67-27537 HC$3.00 MF$0.65

DEVELOPMENT OF CATHODIC ELECTROCATALYSTS FOR USE IN LOW TEMPERATURE H2/O2 FUEL CELLS WITH AN ALKALINE ELECTROLYTE QUARTERLY REPORT 1 OCT. - 31 DEC. 1966.
Tyco Labs., Inc., Waltham, Mass.
R. Cattabriga, J. Giner, J. Parry, and L. Swette.
31 Dec 66, 88p NASA-CR-84459, Q-6
Contract NASW-1233

Descriptors: *Carbide, *Catalytic activity, *Fuel cell, *Iron compound, *Nitride, Activity, Alloy, Catalyst, Cathode, Cell, Compound, Current, Curve, Electrolyte, Fuel, Hydrogen, Hydroxide, Iron, Low temperature, Osmium, Peroxide, Platinum, Potassium, Voltage.

For abstract, see STAR 05 14.
N67-27546 HC$3.00 MF$0.65

THE FILTRATION OF AEROSOLS BY GLASS FIBRE FILTERS. I - INFLUENCE OF THE AEROSOL PARTICLE SIZE AND THE LINEAR FLOW VELOCITY.
Chemical Lab. RVO-TNO, Rijswijk (Netherlands).
For primary bibliographic entry see Field 20D.
For abstract, see STAR 05 14.
N67-27552 HC$3.00 MF$0.65

HALITE THERMOMETER FOR X-RAY INVESTIGATION OF SUBSTANCES IN THE TEMPERATURE INTERVAL FROM 77 TO 1037 DEG K.
Galitovyy Termometr Dlya Rentgenovskofo Issledovaniya Veshchestv V Intervale Temperatur Ot 77 Do 1037degk
Scientific Translation Service, La Cannda, Calif.
V. M. Kozhin. Jun 67, 7p NASA-TT-F-11002
Contract NASW-1496
Transl. Into English From Pribory I Tekhn. Eksperim. (Moscow), No. 1, 1967 P 185-188

Descriptors: *Crystal optics, *Sodium chloride, *Thermal expansion, *X-ray diffraction, Analysis, Angle, Chloride, Crystal, Diffraction, Expansion, Lattice, Linearity, Optics, Organic, Photography, Reflection, Sodium, Standard, Substance, Temperature, Thermal, Variation, X-ray.

For abstract, see STAR 05 14.
N67-27567 HC$3.00 MF$0.65

7E. RADIO AND RADIATION CHEMISTRY

UPGRADING OF POLYMERIC MATERIALS FOR ELECTRICAL APPLICATIONS.
Radiation Applications, Inc., Long Island City, N. Y.
For primary bibliographic entry see Field 11I.
AD-463 790 HC$3.00

F-CENTER FORMATION BY FUNDAMENTAL ABSORPTION IN KI.
Cornell Univ., Ithaca, N. Y. Materials Science Center.
For primary bibliographic entry see Field 20B.
AD-643 486 HC$3.00 MF$0.65

ATOMIC READJUSTMENT TO AN INNER-SHELL VACANCY: MANGANESE K X-RAY EMISSION SPECTRA FROM AN Fe55 K-CAPTURE SOURCE AND FROM THE BULK METAL.
Revised ed.,
Cornell Univ Ithaca N Y Lab of Atomic anu Solid State Physics
Herbert W. Schnopper. 28 Sep 66, 7p
AFOSR-67-1141
Contract AF 49 (638)-402
Revision of manuscript submitted 11 Mar 66.
Availability: Published in The Physical Review v154 n1 p118-23 Feb 5 1967.

Descriptors: (*Manganese, *X-ray spectroscopy), (*Iron, Electron capture), (*Atomic orbitals, Excitation), Emissivity, Line spectrum, Atomic energy levels, Ground state, Electron transitions, Ionization, Absorption spectrum.

A comparison is made between manganese K-alpha-1,3 and K-beta-1,3 x-ray emission lines with initial states produced (a) by electron bombardment (EB) of a metal anode at 13 and 15 keV and (b) by K capture (KC) in Fe.55 and relative intensity. The complex K-beta' secondary structure on the low-energy side of K-beta-1,3 is also independent of the means of production of the initial state. It is argued that K capture leads to an essentially pure, single-hole, relaxed ground state and that the probability of multiple hole production is negligibly small. From the comparison of the spectra, it is concluded that upon the production of a K hole by a low-energy knockout process, the state formed with highest probability is the ground state for the system with a K hole, and that this state is formed in a time short compared to its life time. Differences between KC and EB spectra would exhibit the effects of either incomplete readjustment and/or multiple hole production. Various mechanisms leading to multiple hole production are qualitatively discussed in terms of previous experimental observations of emission and absorption spectra. (Author)
AD-652 754 Not available from CFSTI

INFORMAL SYMPOSIUM, REVERSIBLE PHOTOCHEMICAL PROCESSES,
Dayton Univ Ohio
Robert C. Bertelson. May 67, 47p
AROD-7040:1-C
Contract DA-31-124-ARO (D)-4
Presented at Symposium on Reversible Photochemical Processes, Dayton, Ohio, 1-3 May 1967.

Descriptors: (*Photochemistry, Symposia), Molecular energy levels, Excitation, Photochromism, Photolysis, Spectroscopy, Photosynthesis, Polymers, Dyes, Lasers, Abstracts.

The document is comprised of abstracts of the 34 papers presented at the symposia.
AD-653 030 HC$3.00 MF$0.65

CHEMILUMINESCENT MATERIALS.
Final rept., 1 Jun 63-31 Dec 66,
American Cyanamid Co Stamford Conn Central Research Div
M. M. Rauhut, and R. A. Clarke. 31 May 67, 208p
Rept no. 06-1432-25-QF
Contract Nonr-4200 (00), ARPA Order-299
Availability: Published in Various reprints.

Descriptors: (*Chemiluminescence, Materials), Oxalates, Hydrogen peroxide, Fluorescence, Emissivity, Colors, Oxychlorides, Hydrazones, Chemical reactions, Oxidation-reduction reactions, Reaction kinetics, Molecular structure, N-heterocyclic compounds, Electroluminescence.
Identifiers: Electro-chemiluminescence, Luminol, Oxalyl chloride.

Exploratory and mechanistic studies of chemiluminescence led to the discovery of an efficient chemiluminescent reaction between electronegatively-substituted oxalic esters, hydrogen peroxide, and fluorescent compounds. The new reaction can provide quantum yields of 23% and light capacities of 105 lumen-hours/liter. Emission lifetimes and color can be varied over wide ranges. Detailed studies of the effects of luminant structure and reaction condition variables on light out-put and emission lifetime are described, and the mechanism of the chemiluminescent process is discussed. Studies of chemiluminescent reactions involving oxalyl chloride and 3-aminophthalhydrazide (luminol) are reported, and a number of new chemiluminescent reactions are described. The discovery of solution phase electron transfer chemiluminescence, involving the oxidation or reduction of ion radicals, and the related discovery of electrochemiluminescence are described. (Author)
AD-653 090 Not available from CFSTI.

RESEARCH AND APPLICATION PROGRAM FOR A SOLID CHEMILUMINESCENT REACTANT.
TRW Systems Redondo Beach Calif
For primary bibliographic entry see Field 11G.
AD-653 153 HC$3.00 MF$0.65

RADIATION DAMAGE IN SOLIDS: COMPILATION OF ABSTRACTS,
Library of Congress Washington D C Aerospace Technology Div
For primary bibliographic entry see Field 18H.
AD-653 185 HC$3.00 MF$0.65

DETERMINATION OF PARTIAL PHOTOIONIZATION CROSS SECTIONS BY PHOTOELECTRON SPECTROSCOPY,
Adelaide Univ (Australia) Dept of Physics
A. J. Blake, and J. H. Carver. 1967. 27p
Grant AF-AFOSR-1131-66

Descriptors: (*Gas ionization, Probability), (*Photoelectrons, Spectroscopy), (*Oxygen, Ionization), (*Nitrogen, Ionization), (*Water vapor, Ionization), Photochemistry, Spectrometers, Molecular energy levels, Electron transitions, Fluorescence, Dissociation, Relaxation time, Photolysis, Australia.

A photoelectron energy spectrometer was used to determine partial photoionization cross sections of molecular oxygen, nitrogen and water vapour for monochromatic incident radiation in the wavelength range 584 - 900A. For each gas, cross sections were determined for transitions to particular ionic states which were identified by measuring the corresponding photoelectron energy. For molecular oxygen, cross sections were determined for transitions to the X (2)Pi-g, (a (4)Pi-u + A (2)Pi-u) b (4) Sigma (-)g and (2)Sigma (-)g states of O2 (+) and at incident wavelengths longer than 680A a process of fluorescent autoionization involving quasi-stable states of the neutral oxygen molecule was also observed. Molecular nitrogen cross sections corresponding to transitions to the X (2)Sigma (+)g, A (2)Pi-u and B (2)Sigma (+)u states of N2 (+) were determined. For water vapour, cross sections corresponding to transitions to the (2)Bl and (2)Al states of H2O (+) were observed in addition to processes of dissociative ionization. In all cases the measurements illustrate the competition between various modes of decay which are energetically possible for incident radiation of a given wavelength. (Author)
AD-653 214 HC$3.00 MF$0.65

ROLE OF SINGLET EXCITED STATES OF MOLECULAR OXYGEN IN THE QUENCHING OF ORGANIC TRIPLET STATES,
California Univ Riverside Dept of Chemistry
For primary bibliographic entry see Field 7D.
AD-653 228 Not available from CFSTI.

PHOTOFRAGMENTATION OF EPOXIDES. IV. PRECURSORS FOR PHENYLCYANOCARBENE,
Louisiana State Univ New Orleans Dept of Chemistry
Panayotis C. Petrellis, Hilmar Dietrich, Ernst Meyer, and Gary W. Griffin. 6 Feb 67, 6p
AROD-6318:1
Grant DA-ARO (D)-31-124-G874
Availability: Published in Journal of the American Chemical Society v89 n8 p1967-9 Apr 12 1967.

Descriptors: (*O-heterocyclic compounds, *Photolysis), (*Nitriles, Synthesis (Chemistry)), Aromatic compounds, Ethers, Photochemistry, Chemical reactions, Spectra (Infrared).
Identifiers: Carbenes, Epoxides, Phenyl oxiranes.

A previously described photofragmentation method (see, e.g., Angew. Chem v77 p859 1965) was extended to certain substituted phenyloxiranes. The method was found to provide convenient precursors for 9substituted phenylcarbenes, including cyano phenylcarbene, methoxy phenylcarbene, and carbomethoxy phenycarbene.
AD-653 239 Not available from CFSTI.

CHEMISTRY OF POSITIVE IONS. VI. POSITIVE-ION CHEMISTRY IN SOLID METHANE,
California Univ Los Angeles
Donald R. Davis, W. F. Libby, and W. G. Meinschein. 29 Jul 66, 15p
AFOSR-67-1232
Grant AF-AFOSR-245-65
See also AD-613 305.
Availability: Published in The Journal of Chemical Physics, v45 n12 p4481-92 15 Dec 1966.

Descriptors: (*Radiation chemistry, Methane), (*Methane, Polymerization), Ions, Photolysis, Dose rate, Solidified gases, Alkanes, Reaction kinetics, Polymers, Microanalysis, Nuclear magnetic resonance, Spectra (Infrared), Gas chromatogra hy, Heat of combustion.

The effects of gamma rays (Co60) on crystalline methane of 77K are the production of an oil of mean composition C20H40 and hydrogen. Little else is formed. This remarkable transformation is thought to be due to the chemical properties of the ions made possibly CH2 (+) or CH3 (+). The polymer apparently is formed in the same size at all doses since its molecular weight (by osmotic pressure) was found to be the same for 150 megarads as for 4. It seems likely that this type of remarkable polymerization reaction is in part the origin of the Miller-Urey compounds and of those in meteorites. (Author)
AD-653 381 Not available from CFSTI.

INFLUENCE OF OXIDATION PRODUCTS ON THE CHEMILUMINESCENT OXIDATION OF TETRAKIS (DIMETHYLAMINO)ETHYLENE.
Technical pub.,
Naval Ordnance Test Station, China Lake, Calif.
W. R. Carpenter, and E. M. Bens. Feb 67, 29p
NOTS-TP-4212

Descriptors: (*Ethylenes, Oxidation), (*Chemiluminescence, Ethylenes), (*Amines, Oxidation), Quenching (Inhibition), Concentration (Chemistry), Solubility, Solvents, Siloxanes, Gas chromatography.
Identifiers: Solvolysis, Tetrakis (Dimethylamino)Ethylenes

Light emitted during the oxidation of tetrakis (dimethylamino)ethylene (TMAE) was found to be profoundly influenced by TMAE oxidation products and certain additives. Although the low-boiling oxidation products have no effect upon the emitteu light, tetramethyl urea was found to be a major quencher. It was observed that only a fraction of the potential light, anticipated from dilution calculations, was emitted in 'normal' TMAE oxidation. Addition of TMAE nonsolvents such as water and dimethysulfoxide reduces the concentration of oxidation products and increases the light intensity; water further increased the light intensity by increasing the rate of reaction. Aliphatic hydrocarbons and dimethylsilicone fluids were found to be satisfactory nonquenching diluents. (Author)
AD-806 625 HC$3.00 MF$0.65

COMPUTER PROGRAM FOR THE KINETIC TREATMENT OF RADIATION-INDUCED SIMULTANEOUS CHEMICAL REACTIONS,
Argonne National Lab., Ill.
Klaus H. Schmidt. Apr 66, 51p
Contract W-31-109-eng-38

Descriptors: (*Radiation chemistry, Computer programs), (*Programming (Computers), Chemical reactions).

For abstract, see NSA 21 02.
ANL-7199 HC$3.00 MF$0.65

IN-CELL RECORDING OPTICAL SPECTROMETER,
Battelle-Northwest, Richland, Wash. Pacific Northwest Lab.
For primary bibliographic entry see Field 18D.
For abstract, see NSA 21 12.
BNWL-337 HC$3.00 MF$0.65

PROCESSING OF PLUTONIUM BY ION EXCHANGE. VIII. SELF-DIFFUSION STUDIES IN ANION-EXCHANGE RESIN,
Los Alamos Scientific Lab., N. Mex.
For primary bibliographic entry see Field 7A.
For abstract, see NSA 20 23.
LA-3534 HC$1.00 MF$0.50

ACTIVATION ANALYSIS AT THE SORIN CENTER.
Societa Ricerche Impianti Nucleari, Saluggia (Italy). Centro Ricerche Nucleari.
For primary bibliographic entry see Field 18I.
For abstract, see STAR 05 14.
N67 -27247 HC$3.00 MF$0.65

STUDY OF PHENOMENA CONNECTED WITH RADIATION DAMAGE IN IRON - INTERACTION BETWEEN DEFECTS INTRODUCED AND ATOMS IN INTERSTITIAL SOLUTION.
Societa Ricerche Impianti Nucleari, Saluggia (Italy). Centro Ricerche Nucleari.
For primary bibliographic entry see Field 20L.
For abstract, see STAR 05 14.
N67-27250 HC$3.00 MF$0.65

THE RADIOLYTIC AND PYROLYTIC DECOMPOSITION OF ORGANIC COOLANTS. V - THE THERMAL DECOMPOSITION OF O-TERPHENYL, M-TERPHENYL AND P-TERPHENYL IN THE PRESENCE OF ATTAPULGUS CLAY.
European Atomic Energy Community, Ispra (Italy). Chemistry Dept.
For primary bibliographic entry see Field 18J.
For abstract, see STAR 05 14.
N67-27258 HC$3.00 MF$0.65

THE RADIOLYTIC AND PYROLYTIC DECOMPOSITION OF ORGANIC COOLANTS. II - THE POSTPYROLYSIS OF PREIRRADIATED OM2.
European Atomic Energy Community, Ispra (Italy). Chemistry Dept.
For primary bibliographic entry see Field 18J.
For abstract, see STAR 05 14.
N67-27259 HC$3.00 MF$0.65

ESTIMATES OF ALPHA-DECAY LIFETIMES FOR SUPERHEAVY NUCLEI,
California Univ., Livermore. Lawrence Radiation Lab.
J. W. Truran. 27 Feb 67, 12p
Contract W-7405-eng-48

Descriptors: (*Alpha decay, *Nuclear reactions), (*Neutron lifetime, Wave functions), Radioactive isotopes, Neutron capture.

For abstract, see NSA 21 12.
UCRL-50183 HC$3.00 MF$0.65

8. EARTH SCIENCES AND OCEANOGRAPHY

8A. BIOLOGICAL OCEANOGRAPHY

INFLUENCE OF THE AMAZON RIVER OUTFLOW ON THE ECOLOGY OF THE WESTERN TROPICAL ATLANTIC. I. HYDROGRAPHY AND NUTRIENT CHEMISTRY.
Technical rept.,
Woods Hole Oceanographic Institution Mass
J. H. Ryther, D. W. Menzel, and Nathaniel Corwin. 29 Aug 66, 19p Rept no. WHOI-Ref-67-19, WHOI-Contrib-1812
Contracts Nonr-2196 (00), N00014-66-C-0241
Availability: Published in Journal of Marine Research v25 n1 p69-83 1967.

Descriptors: (*Atlantic Ocean, Tropical regions), (*Marine biology, Tropical regions), Caribbean Sea, Ocean currents, River currents, Oceanology, Salinity, South America, Nitrates, Phosphates, Plankton, Silicates, Oceanographic data.
Identifiers: Amazon River, Guiana Current.

The influence of the Amazon River discharge on the nutrient chemistry and biological productivity in the western tropical Atlantic and the eastern Caribbean was investigated during two oceanographic cruises in the fall of 1964 and the spring of 1965, respectively. The river outflow is entrained in the Guiana Current and carried to the north and east, affecting an area that is at times a million square miles, as indicated by surface salinity. The effect is greater during the South American rainy season (spring-summer) than during the dry season (fall-winter), in terms of both total area influenced and the degree of freshening of the surface water. On both cruises, a large lens of appreciably freshened surface water (200-300 miles in diameter) was encountered several hundred miles to the north and east of the Amazon estuary and separated from it by water of higher salinity. In the surface water influenced by the Amazon River compared with the surrounding seawater, the concentrations of nitrate, phosphate, and phytoplanktonic organisms were lower while the levels of silicate were appreciably higher. The direct over-all effect of the river, therefore, is to decrease the fertility of the ocean into which it flows. However, a region of high biological activity was encountered in the Guiana Current between the coast ofthe Guianas and the above-mentioned lens of freshened surface water. This resulted from geostrophic uptilting of water in that region, bringing nutrient-rich subsurface water into the euphotic layer; possibly this was caused or enhanced by the weight of the accumulated river water offshore. (Author)
AD-652 888 Not available from CFSTI.

A STUDY OF THE CORE-MANTLE BOUNDARY USING P WAVES DIFFRACTED BY THE EARTH'S CORE.
Revised ed.,
Princeton Univ N J Dept of Geology
Shelton S. Alexander, and Robert A. Phinney. 14 Sep 66, 19p
AFOSR-67-1193
Contract AF 49 (638)-1243, Grant NSF-GP-579
Revision of manuscript submitted 3 Aug 66.
Availability: Published in Journal of Geophysical Research v71 n24 p5943-58 Dec 15 1966.

Descriptors: (*Seismic waves, Diffraction), (*Structural geology, Seismic waves), Mechanical waves, Distribution, Propagation, Interfaces, Attenuation, Resonance.
Identifiers: Core (Earth), Mantel (Geology).

Ratios of the spectrums of diffracted P waves can be used to isolate effects of propagation along the core-mantle boundary, and the rate of attenuation with distance as a function of frequency is a useful quantitative measure of core-mantle properties. Spectrums of the attenuation coefficient for a number of patches on the core-mantle boundary were measured in the frequency range 0.01 to 0.12 cps, using data from large earthquakes in different locations. Although the general trend of the observations follows the theoretically expected f to the 1/3rd frequency dependence, significant lateral variations occur both in level and shape of the attenuation spectrum, implying lateral variations in core-mantle properties. In particular, resonance absorption peaks are observed at certain frequencies which may be a consequence of layering in the deepest part of the mantle. The results are correlated with geographic location in an effort to commence to map the lateral variations in core-mantle properties. In addition, the observed phase spectrums indicate that the diffracted P waves are dispersed litter or none at all for core-mantle boundary propagation. (Author)
AD-652 954 Not available from CFSTI.

THE ISLA DE LOBOS AND ASSOCIATED REEFS, VERACRUZ, MEXICO.
Louisiana State Univ Baton Rouge Coastal Studies Inst
For primary bibliographic entry see Field 8G.
AD-653 038 Not available from CFSTI.

SOME OCTOCORALLIA OF ISLA DE LEBOS, VERACRUZ, MEXICO.
Technical rept.,
Louisiana State Univ Baton Rouge Coastal Studies Inst
C. Kent Chamberlain. 24 May 66, 10p Rept no. TR-43
Contract Nonr-1575 (03)
Prepared in cooperation with Wisconsin Univ., Madison.
Availability: Published in Unidentified Journal.

Descriptors: (*Sedimentation, *Mexico Gulf), (*Invertebrates, Sedimentation), Reefs, Colors, Ocean bottom, Marine biology, Sampling.

The study of the invertebrate collection made during a five week biologic and sediment study of the reef. Isla de Lobos was selected for this study by the Coastal Studies Institute at Louisiana State University, Baton Rouge, Louisiana, because it is the most northern reef in the western portion of the Gulf of Mexico which has a sand cay. Size, color, zonation, and shape of spiculation is diagnostic; in addition, size, color, and shape of the colonies is equally important. (Author)
AD-653 039 Not available from CFSTI.

LIST OF MARINE ALGAE OF SOUTHERN SAKHALIN AND THE SOUTHERN KURILB ISLANDS,
Naval Oceanographic Office Washington D C
For primary bibliographic entry see Field 6C.
AD-653 067 HC$3.00 MF$0.65

RECENT COASTAL SEDIMENTATION: CENTRAL LOUISIANA COAST.
Louisiana State Univ Baton Rouge Coastal Studies Inst
For primary bibliographic entry see Field 8H.
AD-653 092 HC$3.00 MF$0.65

THE MICROBIAL CORROSION OF IRON.
Miami Univ Fla Inst of Marine Science
For primary bibliographic entry see Field 11F.
AD-653 368 HC$3.00 MF$0.65

TRANSPORTED TURTLE GRASS AS A SOURCE OF ORGANIC ENRICHMENT OF ABYSSAL SEDIMENTS OFF NORTH CAROLINA.
Technical rept.,
Woods Hole Oceanographic Institution Mass
Robert J. Menzies, Jacques S. Zaneveld, and Richard M. Pratt. 6 Sep 66, 9p Rept no. WHOI-Ref-67-22, WHOI-Contrib-1845
Contract N00014-66-C-0241
Availability: Published in Deep-Sea Research v14 p111-2 1967.

Descriptors: (*Sedimentation, *Marine biology), Grasses, Organic materials, Depth indicators, Florida, Sea water, Ocean bottom sampling, Bermuda, Plants (Botany), Bahama Islands, Mexico Gulf.

The finding of a considerable amount of turtle grass at abyssal depths off North Carolina and at bathyal depth off Florida suggests a continuing fall-out of sea grass as a source of organic enrichment for the deep-sea floor. Turtle grass does not grow in the Carolinas but is abundant in Southern Florida, Bermuda, and the Bahamas; which indicates that the grass is distributed by the Gulf Stream rather than simple shore-to-depth transport. (Author)
AD-653 370 Not available from CFSTI.

8B. CARTOGRAPHY

A SPHERICAL HARMONIC ANALYSIS OF THE EARTH'S TOPOGRAPHY,
California Univ Los Angeles Inst of Geophysics and Planetary Physics
For primary bibliographic entry see Field 8F.
AD-652 769 Not available from CFSTI.

SOME QUESTIONS RELATED TO THE MATHEMATICAL DESCRIPTION OF THE PHOTOGRAPHIC PROCESS,
HRB-Singer Inc State College Pa
For primary bibliographic entry see Field 14E.
AD-653 083 HC$3.00 MF$0.65

TERRAIN PHOTOGRAPHY ON THE GEMINI IV MISSION - PRELIMINARY REPORT.
National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
P. D. Lowman, Jr., J. A. Mc Divitt, and E. H. White, II. Jun 67, 19p NASA-TN-D-3982
Contract 185-42-01-02-51

Descriptors: *Aerial photography, *Gemini 4 mission, *Synoptic system, *Terrain, Aerial, Camera, Experiment, Geography, Geology, Geophysics, Mapping, Method, Objective, Photography, Result, Synoptic, System.

For abstract, see STAR 05 14.
N67-27274 HC$3.00 MF$0.65

8C. DYNAMIC OCEANOGRAPHY

PILOT MODEL STUDY FOR THE DESIGN OF HILO HARBOR TSUNAMI MODEL HYDRAULIC MODEL INVESTIGATION.
Research rept.,
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
J. G. Housley. Mar 65, 86p AEWES-RR-2-3
See also AD-646 509.

Descriptors: (*Ocean waves, Model tests), (*Harbor models, Model tests), Hydraulic models, Bays, Harbors, Oscillation, Generators, Design, Ocean models, Tides, Floods.
Identifiers: Tsunamis, Hilo Harbor.

Tests were conducted on a pilot model of Hilo Bay to determine whether distortion of scales was appropriate for a tsunami model. The test results showed that a distortion factor of three had negligible effect on the amplification factor and location of bores within the bay. The tests also showed that a resonant model ocean area was not required for proper generation of the bores. A simple rise and fall of water surface at the bay mouth created a strong wave amplification within the bay if the period of oscillation was near that computed for resonant response of the bay. This period depends only on the geometry of the bay. Absorbers can be used between the wave generator and the bay mouth to reduce re-reflected waves; thus, the wave generator can be positioned quite close to the bay mouth. Three memoranda by Keulegan, giving theoretical developments in tsunami model design, are appended. (Author)
AD-646 501 HC$3.00 MF$0.65

REPRESENTATION OF NEARSHORE DISTORTION OF TSUNAMIS BY BILINEAR OPERATORS,
Hawaii Inst of Geophysics Honolulu
Gordon W. Groves, and Robert R. Harvey. Mar 67, 33p Rept no. HIG-67-4
Contracts Nonr-3748 (03), C-226-66 (G)

Descriptors: (*Ocean waves, Distortion), (*Seacoast, *Islands), Hawaii, Geophysics, Environment, Naval research, Operators (Mathematics), Input-output devices, Transformations (Mathematics), Real numbers.

Tsunamis exhibit nonlinear behavior at islands and continental coastlines. The transformation from deep to shallow water has been approximated by the first three terms of the multidimensional Taylor expansion, the constant, linear, and bilinear terms. The transformation operator, or emulator, has been determined from marigrams at Midway and Hilo for a single tsunami, letting Midway approximate the deep-water input to Hilo. It is then applied to the Midway record from the same tsunami and from a second tsunami. The outputs, or emulations, are compared to Hilo records for the respective tsunamis. The difference between them is summarized by the RMS residue. The emulators determined from different tsunamis and different lag configurations are compared. The results indicate the simple 'input-output' hypothesis is not justified in these cases.
AD-652 814 HC$3.00 MF$0.65

INFLUENCE OF THE AMAZON RIVER OUTFLOW ON THE ECOLOGY OF THE WESTERN TROPICAL ATLANTIC. I. HYDROGRAPHY AND NUTRIENT CHEMISTRY.
Woods Hole Oceanographic Institution Mass
For primary bibliographic entry see Field 8A.
AD-652 888 Not available from CFSTI.

SOME LABORATORY EXPERIMENTS ON ROSSBY WAVES IN A ROTATING ANNULUS.
Woods Hole Oceanographic Institution Mass
For primary bibliographic entry see Field 20D.
AD-652 889 Not available from CFSTI.

AN ALGORITHM FOR OBTAINING SOLUTIONS TO LAPLACE'S TIDAL EQUATIONS,
Atmospheric Sciences Lab White Sands Missile Range N Mex
For primary bibliographic entry see Field 12A.
AD-653 002 HC$3.00 MF$0.65

THE ISLA DE LOBOS AND ASSOCIATED REEFS, VERACRUZ, MEXICO.
Louisiana State Univ Baton Rouge Coastal Studies Inst
For primary bibliographic entry see Field 8G.
AD-653 038 Not available from CFSTI.

BEACH CHANGES ON THE OUTER BANKS OF NORTH CAROLINA.
Technical rept.,
Louisiana State Univ Baton Rouge Coastal Studies Inst
Robert Dolan. 15 Jul 65, 15p Rept no. TR-48
Contract Nonr-1575 (03)
Prepared in cooperation with Virginia Univ., Charlottesville.
Availability: Published in Annals of Association of American Geographers v56 n4 p699-711 Dec 1966.

Descriptors: (*Beaches, North Carolina), (*Erosion, Beaches), Ocean waves, Tides, Ocean currents, Sedimentation, Seacoast, Atlantic Ocean, Periodic variations.

Relationships between surf-zone processes and subaerial beach changes are considered as they occur on Bodie Island, North Carolina. The processes include: wave height, wave period, wave direction, and still-water level. Measurements of beach change include: beach thickness, width, and slope, as well as the size and sorting of the beach-face sediment. Analysis reveals that changes in these beach characteristics are predictable using only two of the process factors considered: wave height and still-water level. Large waves with high water levels cause rapid reductions in beach thickness, width, and slope. Small waves with low water levels are associated with thicker, wider, and steeper beaches. Sediment size and sorting show little association with the processes of beach configuration. (Author)
AD-653 040 Not available from CFSTI.

EPHEMERAL ESTUARIES OF THE DELTAIC ENVIRONMENT.
Louisiana State Univ Baton Rouge Coastal Studies Inst
For primary bibliographic entry see Field 8H.
AD-653 043 Not available from CFSTI.

ORIGINS OF ESTUARIES.
Louisiana State Univ Baton Rouge Coastal Studies Inst
For primary bibliographic entry see Field 8H.
AD-653 044 Not available from CFSTI.

RATIONAL STRUCTURE OF FORMULAS FOR CALCULATING THE STATISTICAL CHARACTERISTICS OF WAVE LOADS,
Naval Ship Systems Command Washington D C
For primary bibliographic entry see Field 13J.
AD-653 082 HC$3.00 MF$0.65

RECENT COASTAL SEDIMENTATION: CENTRAL LOUISIANA COAST.
Louisiana State Univ Baton Rouge Coastal Studies Inst
For primary bibliographic entry see Field 8H.
AD-653 092 HC$3.00 MF$0.65

A STUDY OF THE LOOP CURRENT IN THE EASTERN GULF OF MEXICO.
Master's thesis,
Texas A and M Univ College Station Dept of Oceanography
Jon M. Hubertz. May 67, 102p Rept no. Ref-67-4T
Contract Nonr-2119 (04)

Descriptors: (*Ocean currents, *Mexico Gulf), Oceanographic data, Salinity, Temperature, Bathythermographs, Velocity, Depth indicators, Surface properties, Terrain, Sea water, Dynamics, Digital computers, Mathematical analysis, Ocean bottom, Tables, Maps.

A physical oceanographic survey was made in June 1966 using an instrument which measures salinity and temperature as continuous functions of depth. Data was also gathered using Nansen casts, bathythermographs, and the geomagnetic electrokinetograph. The Loop Current was found to extend to 27 deg. 30 min. N with a smaller secondary loop at its northern tip. Average speeds in the current were 2 knots with associated transports of 45 x 1,000,000 cu m/sec around the major loop within the Gulf. The Loop Current bounded a water mass, the Eastern Gulf Loop Water, distinct from that found elsewhere in the Gulf of Mexico. The average circulation patter was found to be less complex than those presented previous to 1967. (Author)
AD-653 268 HC$3.00 MF$0.65

A COMPILATION OF OBSERVATIONS FROM MOORED CURRENT METERS AND THERMOGRAPHS. VOLUME I: OREGON CONTINENTAL SHELF, JULY 1965-FEBRUARY 1966,
Oregon State Univ., Corvallis. Dept. of Oceanography.
For primary bibliographic entry see Field 8J.
PB-173 933 HC$3.00 MF$0.65

8E. GEODESY

A DELAYED COMMAND SYSTEM FOR A NEAR-EARTH SATELLITE.
Johns Hopkins Univ Silver Spring Md Applied Physics Lab
For primary bibliographic entry see Field 22C.
AD-652 816 HC$3.00 MF$0.65

AN AUTOMATIC-ELECTRO OPTICAL SATELLITE TRIANGULATION SYSTEM.
Research note,
Army Engineer Geodesy Intelligence and Mapping Research and Development Agency Fort Belvoir Va
Arne Bjerhammar. Apr 67, 45p Rept no. RN-23

Descriptors: (*Geodesics, *Satellites (Artificial)), Accuracy, Errors, Data processing systems, Triangulation, Astronomical geodesics, Targets, Telescopes, Trajectories.

The passage of light-emitting targets over a special reticule of a telescope are recorded by photoelectric means on (magnetic) tape and then processed in an electric computer. The system is useful for satellite triangulation and studies of trajectories. (Author)
AD-652 882 HC$3.00 MF$0.65

HARBOR SURVEY ASSISTANCE PROGRAM CONDUCTED BY NAVOCEANO IN THE VICINITY OF PUERTO BARRIOS, GUATEMALA.
Naval Oceanographic Office Washington D C
For primary bibliographic entry see Field 17G.
AD-653 085 HC$3.00 MF$0.65

LINEAR SOLUTIONS OF THE GEODETIC BOUNDARY-VALUE PROBLEM,
Ohio State Univ Columbus Dept of Geodetic Science
Helmut Moritz. Dec 66, 143p Rept no. Scientific-11, 79
AFCRL-67-0044
Contract AF 19 (628)-5701

Descriptors: (*Geodesics, Boundary value problems), Gravity, Approximation (Mathematics), Anomalies, Integral equations, Special functions (Mathematical), Terrain, Height finding.
Identifiers: Molodensky's formula.

The report is concerned with formulas for the determination of the earth's physical surface and external gravity field from free-air gravity anomalies to an approximation linear in the elevation and its derivatives. Part A considers integral equations and their linear solutions; Part B gives an elementary deduction of these solutions from the geometrically evident gradient solution; and the subject of Part C is an application to various gravity-dependent quantities and an evaluation of different solutions. (Author)
AD-653 193 HC$3.00 MF$0.65

COMPARISON OF SATELLITE GEOIDS AND ANOMALY FIELDS,
Ohio State Univ Columbus Dept of Geodetic Science
Richard H. Rapp. Feb 67, 103p Rept no. Scientific-12, 80
AFCRL-67-0151
Contract AF 19 (628)-5701

Descriptors: (*Gravity, Anomalies), (*Scientific satellites, Gravity), Earth (Planet), Accuracy, Experimental data, Mathematical analysis.
Identifiers: Geoids.

Various determinations of the harmonic coefficients in the expansion of the earth's gravitational field have been compared in terms of geoids and gravity anomalies. The most recent satellite solution of Anderle agrees fairly well (when comparing common coefficients) with the Gaposchkin solution (RMS difference = plus or minus 5.9 m) but does not agree well with the recent Kaula field from combined satellite and terrestrial data (RMS difference = plus or minus 9.2 m). Estimates made of the effect of the higher-order terms on the undulation values were used to estimate the over-all accuracy figure for current solutions as plus or minus 9.9 m. The error committed by neglecting terms higher than n=8 was estimated as plus or minus 6 m; beyond n=12, plus or minus 4 m; and beyond n=15, plus or minus 3 m. Comparisons of the solutions for various size blocks showed better agreement, the larger the blocks. Accuracy estimates for mean anomaly evaluations from the current satellite solutions were: 5 degrees x 5 degrees, plus or minus 15 mgal; 10 degrees x 10 degrees, plus or minus 12 mgal; 15 degrees x 15 degrees, plus or minus 10 mgal; 20 degrees x 20 degrees, plus or minus 7 mgal; and 30 degrees x 30 degrees, plus or minus 3 mgal. Comparisons of the satellite anomalies were also made to terrestrial anomalies in 5 degrees x 5 degrees and 30 degrees x 30 degrees blocks. The 5 degree comparison was used to demonstrate a method for the determination of equatorial gravity. (Author)
AD-653 194 HC$3.00 MF$0.65

ATTAINABLE SETS AND GENERALIZED GEODESIC SPHERES,
Brown Univ Providence R I Center for Dynamical Systems
H. Hermes. 1967, 18p
AFOSR-67-1264
Grant AF-AFOSR-693-65, Contract NAS8-11264
Availability: Published in Journal of Differential Equations v3 n2 p256-70 Apr 1967.

Descriptors: (*Geodesics, *Spheres), (*Topology, Geodesics), Functions, Statistical processes, Geometry, Ellipsoids, Theory.

The paper studies properties of the set of attainability (or reachable set) for a class of nonlinear control problems formulated as contingent equations. The attainable set phi (t) is defined as the set of all states attainable at time t, from a fixed initial state xo, by trajectories of the control system using all possible controls. Particular emphasis is placed on a study of the boundary of phi (t), denoted alpha phi (t). A trajectory is an extremal if it satisfies the conditions of the maximum principle. The set s (t) of points attainable by extremals at time t (i.e. the geodesic sphere of radius t) is studied in relation to alpha phi (t). It is shown that alpha phi (t) included in s (t). Under appropriate assumptions and for t sufficiently small, these sets are equal and S (t) is an imbedded sphere. As t increases S (t) may become an immersed sphere, in which case the degree of its Gauss map remains one. Also, as t increases one may encounter conjugate points, in which case S (t) ceases to be immersed. Other properties and several examples are given. (Author)
AD-653 317 Not available from CFSTI.

MATHEMATICAL CONSIDERATIONS OF THE MODIFIED NORMAL DISTRIBUTION,
National Research Council of Canada Ottawa (Ontario)
For primary bibliographic entry see Field 12A.
AD-653 390 Not available from CFSTI.

8F. GEOGRAPHY

SEASONAL CHANGE REVEALED BY TIME-LAPSE PHOTOGRAPHY.
Technical rept.,
Army Natick Labs Mass Earth Sciences Div
Roland J. Frodigh. Mar 67, 61p Rept no. ES-27
USA-NLABS-TR-67-34-ES

Descriptors: (*Periodic variations, *Color photography), Photographic techniques, Time, Photographic texture, Temperature, Plants (Botany), Climatology, Color film, Maps, Density, Mapping, Terrain, Environment, Camouflage, Armed forces operations, Visibility, New Hampshire, Vermont, Massachusetts.

The report demonstrates the application of time-lapse photographi ctechniques to a study of seasonal changes in coloration and appearance at sixteen locations in New England. The sites used to illustrate the method were selected for their representativeness of the four major physiographic regions: coastal lowland, uplands, interior lowlands, and mountains. Individual landscapes were photographed in color during each season, recording the identical field-of-view from the same spot locations. The photography is supplemented by topographic, vegetation, and climatic maps, graphs, site data, and narrative descriptions. Factors pertaining to camouflage problems are documented photographically to illustrate significant changes in vegetation color. The combination of maximum visibility and minimum cancpy coverage during periods of vegetation dormancy in forested areas is contrasted with greatly reduced visibility and nearly complete canopy coverage during the growing season. Trafficability problems in off-road areas are strikingly evident in scenes depicting winter snow accumulation and seasonal flooding in spring. (Author)
AD-652 732 HC$3.00 MF$0.65

A SPHERICAL HARMONIC ANALYSIS OF THE EARTH'S TOPOGRAPHY,
California Univ Los Angeles Inst of Geophysics and Planetary Physics
W. H. K. Lee, and W. M. Kaula. 6 Sep 66, 6p
Rept no. Pub-529
Contract AF 23 (601)-4171, Grant NsG-216-62
Availability: Published in Journal of Geophysical Research v72 n2 p753-8 Jan 15 1967.

Descriptors: (*Terrain, Analysis), Special functions (Mathematical), Errors, Interpolation, Standards, Height finding, Experimental data, Tables, Oceans.

This article discusses mean values for vnrious features of the earth's topography. This includes oceanic area (%), continental area (%), mean world elevation, mean land elevation, and mean ocean depth. Sources of error in estimates of the mean elevations are discussed.
AD-652 769 Not available from CFSTI.

THE EFFECT OF TOPOGRAPHY AND GEOLOGY ON TELLURIC CURRENTS,
Alaska Univ College Geophysical Inst
For primary bibliographic entry see Field 8N.
AD-652 859 Not available from CFSTI.

MONTHLY MICROCLIMATIC SUMMARY, SEPTEMBER 1966: ENVIRONMENTAL DATA BASE FOR REGIONAL STUDIES IN THE HUMID TROPICS,
Army Tropic Test Center Fort Clayton Canal Zone
For primary bibliographic entry see Field 4B.
AD-652 886 HC$3.00 MF$0.65

AREA HANDBOOK FOR ECUADOR,
American Univ Washington D C Foreign Area Studies Div
Edwin E. Erickson, Helen A. Barth, Frederic H. Chaffe, Gabriel De Cicco, and John H. Dombrowski. Aug 66, 559p
DA-PAM-550-52
Availability: Hard copy available from Superintendant of Documents, Washington, D. C., 20402. G.P.O. Price $3.00.

Descriptors: (*Ecuador, Social sciences), (*Economics, Political science), Handbooks, Military government, Culture, Linguistics, Industrial production, Commerce, Agriculture, Money.

This handbook attempts to bring together in unified, but not exhaustive, fashion the social, economic and political elements of the contemporary society. It is intended to provide a meaningful context for the interpretation of current events rather than a detailed account of the events themselves.
AD-653 025 MF$0.65

SOME OCTOCORALLIA OF ISLA DE LEBOS, VERACRUZ, MEXICO.
Louisiana State Univ Baton Rouge Coastal Studies Inst
For primary bibliographic entry see Field 8A.
AD-653 039 Not available from CFSTI.

HARBOR SURVEY ASSISTANCE PROGRAM CONDUCTED BY NAVOCEANO IN THE VICINITY OF PUERTO BARRIOS, GUATEMALA.
Naval Oceanographic Office Washington D C
For primary bibliographic entry see Field 17G.
AD-653 085 HC$3.00 MF$0.65

ICE THICKNESS OBSERVATIONS IN THE NORTH AMERICAN ARCTIC AND SUBARCTIC FOR 1958-59, 1959-60.

Cold Regions Research and Engineering Lab Hanover N H
For primary bibliographic entry see Field 8L.
AD-653 143 HC$3.00 MF$0.65

CLIMATOLOGY OF STAGNATING ANTICYCLONES EAST OF THE ROCKY MOUNTAINS, 1936-1965,
National Center for Air Pollution Control, Cincinnati, Ohio.
For primary bibliographic entry see Field 4B.
PB-174 709 HC$3.00 MF$0.65

8G. GEOLOGY AND MINERALOGY

RADIONUCLIDES IN OCEANS AND SEDIMENTS,
Miami Univ Fla Marine Lab
J. M. Prospero, and F. F. Koczy. 1967, 12p Rept no. Contrib-663
Grant NSF-GP-3575
Research supported in part by AEC, and ONR.
Availability: Published in Encyclopedia of Oceanography v1 p730-40 1967.

Descriptors: (*Radioactive series, *Sedimentation), (*Sedimentary rock, *Oceans), Nuclear reactions, Oceanology, Cosmic rays, Protons, Radioactive decay, Minerals, Rivers, Wind, Geologic age determination, Uranium, Thorium, Half life.

The radioactive nuclides found in the oceans and sediments have three distinctly different orgins: (a) primordial nuclear synthesis, (b) cosmic-ray and solar proton interactions with the atmosphere and interplanetary dust, and (c) nuclear fusion and fission processes controlled by man. In addition, a number of radionuclides produced in these three ways decay to radioactive daughters. Primordial nuclides are those that were produced by nuclear genesis at the time of the creation of the elements; thus, only those radionuclides with half-lives of approximately a billion years or greater will have persisted to this day in significant amounts. The primordial radionuclides found in the oceans and sediments are initially derived from the continents. The weathering of rocks and minerals yields material that is then carried away by land runoff to rivers or by winds. In this manner, large quantities of radioelements eventually reach the oceans, being transported either as dissolved species or in particulate form. Three primordial nuclides, U235, U238, and Th232, decay to radioactive daughters of shorter half-life; these daughters comprise a significant portion of the radioactivity found in the ocean. (Author)
AD-652 743 Not available from CFSTI.

MYSID STATOLITHS IN SHELF SEDIMENTS OFF NORTHWEST NORTH AMERICA,
Northwestern Univ Evanston Ill Dept of Geology
Betty J. Enbysk, and Fay I. Linger. 18 Apr 66, 2p
Grant NSF-GA-296
Prepared in cooperation with Washington Univ., Seattle. Dept. of Oceanography, Contrib-374. Research supported in part by AEC, ONR.
Availability: Published in Journal of Sedimentary Petrology p839-40 Sep 1966.

Descriptors: (*Sedimentation, *Crustacea), Petrology, Calcium fluorides, Oceanology, Shallow water, X-ray spectroscopy, Ocean bottom sampling, Sand, Microphotography, Organic mnterials, Sedimentary rock.

Sand-sized flattened ellipsoids, the statoliths from mysid (opossum shrimp) uropods, are a persistent element in and are restricted to shelf sediments. Smaller, less flattened, non-fluoride statoliths have been found at lower bathymetric levels. (Author)
AD-652 746 Not available from CFSTI.

THE MAGNETIC STRATIGRAPHY OF A DEEP SEA CORE FROM THE NORTH PACIFIC OCEAN,
Lamont Geological Observatory Palisades N Y
G. O. Dickson, and J. H. Foster. 14 Sep 66, 6p Rept no. Contrib-952
Contract Nonr-266 (48), Grant NSF-GP-4004
Availability: Published in Earth and Planetary Science Letters v1 p458-62 1966.

Descriptors: (*Stratigraphy, *Magnetism), Sedimentation, Deep water, Ocean botfom sampling, Correlation techniques, Magnetometers, Sedimentary rock, Ocean currents, Carbonates, Northern Hemisphere, Pacific Ocean.

The study shows that the inclination of remanent magnetization in deep sea sediment cores can be used for purposes of stratigraphic correlation. In an attempt to obtain finer time resolution and possibly extend the known magnetic stratigraphy, a core from the North Central Pacific was selected where low sedimentation rates were expected. The core was sampled continuously by cutting a continuous 2 x 2 cm column into 2 cm lengths. 377 specimens were taken and measured on a 5 cps spinner magnetometer.
AD-652 764 Not available from CFSTI.

PALEOMAGNETIC STRATIGRAPHY, RATES OF DEPOSITION AND TEPHRACHDRONOLOGY IN NORTH PACIFIC DEEP-SEA SEDIMENTS,
Lamont Geological Observatory Palisades N Y
Dragoslav Ninkovich, Neil Opdyke, Bruce C. Heezen, and John H. Foster. 2 Nov 66, 18p Rept no. Contrib-991
Contract Nonr-266 (48), Grant NSF-GP-4004
Availability: Published in Earth and Planetary Science Letters v1 p476-92 1966.

Descriptors: (*Stratigraphy, *Magnetic fields), Sedimentation, Deposits, Volcanoes, Deep water, Ocean bottom sampling, Time, Paleontology, Terestrial magnetism, Pacific Ocean, Northern Hemisphere.

The paleomagnetic stratigraphy of 12 North Pacific deep-sea sediment cores has been investigated and has been used to date volcanic eruptions and to determine rates of deposition of pelagic sediments. Only four of the cores penetrated sediments deposited before the last reversal of the earth's magnetic field (0.7 m.y.). Of these, one penetrated to the Gauss series, two to sediments deposited during the Olduvai event and one penetrated to the middle of the Matuyama series. Eight other cores, 10-16 meters long, taken within 1000 km of the Japan-Kuril-Kamtchatka arc failed to reach the Matuyama series. The rate of deposition in North Pacific pelagic sediments vary from > 2 cm/1000 y in the area east of the Asiatic continent to < 0.8 cm/1000 y in the mid Pacific. Assuming continuous deposition, the length of the Jaramillo event can be established as 50 000 y and the Olduvai event as 14 000 y. The apparent length of time during which the dipole field of the earth was reduced during reversals of the earth's magnetic field is approximately 20 000 y. In one of the cores the top of the Olduvai event is split. This may represent the Gilsa event. The brown volcanic ash present in three of the cores apparently originated in an eruption 1.2 m.y. ago in the Aleutian Arc near the Andreanof Islands. (Author)
AD-652 765 Not available from CFSTI.

THE RELATIONSHIPS AMONG SEQUENCES WITH APPLICATIONS TO GEOLOGICAL DATA.
Revised ed.,
Miami Univ Fla Inst of Marine Science
Warren C. Kemp, and Donald T. Eger. 27 Sep 66, 13p Rept no. Contrib-752
Contract Nonr-4008 (02), Grant NSF-GP-3604
Revision of manuscript submitted 8 Jun 66.
Availability: Published in Journal of Geophysical Research v72 n2 p739-51 Jan 15 1967.

Descriptors: (*Sedimentation, *Sequences), Functions, Equations, Deep water, Power series, Temperature, Density, Errors, Isotopes, Geologic age determination, Mathematical analysis.

Power spectrum density analysis of isotopic variations and other temperature-dependent parameters in the Caribbean cores P6304-8 and P6304-9 yields spectrums which to good approximation are identical with the power spectrum of summer isolation variation at 65N. Identification of the various peaks in the spectrums as astronomical frequencies leads to an accurate method for determining the sedimentation rate in the cores. These rates are in good agreement with those obtained by correlating these cores with others that have been absolutely dated. (Author)
AD-652 766 Not available from CFSTI.

P WAVE DIFFRACTION THEORY AND THE STRUCTURE OF THE CORE-MANTLE BOUNDARY,
Princeton Univ N J Dept of Geology
For primary bibliographic entry see Field 8K.
AD-652 915 Not available from CFSTI.

A STUDY OF THE CORE-MANTLE BOUNDARY USING P WAVES DIFFRACTED BY THE EARTH'S CORE.
Princeton Univ N J Dept of Geology
For primary bibliographic entry see Field 8A.
AD-652 954 Not available from CFSTI.

THE ISLA DE LOBOS AND ASSOCIATED REEFS, VERACRUZ, MEXICO.
Technical rept.,
Louisiana State Univ Baton Rouge Coastal Studies Inst
J. Keith Rigby, and William G. McIntire. 15 Nov 66, 53p Rept no. TR-42
Contract Nonr-1575 (03)
Prepared in cooperation with Brigham Young Univ., Provo Utah.
Availability: Published in Brigham Young University Geology Studies v13 p3-46.

Descriptors: (*Reefs, *Mexico), (*Marine geology, Reefs), Terrain, Ocean bottom topography, Hydrology, Ocean currents, Tides, Seacoast, Algae.

The reef which surrounds Isla de Lobos is one of three closely associated reefs on the eastern coast of Mexico, approximately 70 miles southeast of Tampico, Tamaulipas, and is the northernmost reef with a sand cay on the western margin of the Gulf of Mexico. It rises from a detrital plain, with a depth of approximately 120 feet, to near low tide, where the reef forms a flame-shaped lagoon approximately eight thousand feet long, north-south, and three thousand five hundred feet wide. The island is situated in a shallow lagoon which has an average depth of less than 3 feet and a reef-formed margin which is barely awash at lowest tides. Leeward and windward reefs can be differentiated topographically on fathograms and on the contour map of the reef complex and adjacent areas. Leeward development is characterized by broad, flat-bottomed, but steep-walled grooves, in contrast to more narrow V-shaped grooves in windward development. The reef toe is flanked by calcareous, reef-derived sand on all but the northeast side, where scattered data suggest a rocky floor. Several lagoonal, reef, and surrounding deep-water habitats and communities can be differentiated and were mapped, all seem closely relateu to substrate character. Thalassia and Halimeda blanket much of the lagoon and have trapped a stable sand substrate. These forms, along with Porites spp. and Diploria clivosa, characterize stable sand communities. Unstable sand communities

are poorly developed and only locally present, but infratidal lagoonal rocky-bottom habitats and communities are well developed, even though of limited areal extent. (Author)
AD-653 038 Not available from CFSTI.

SOME OCTOCORALLIA OF ISLA DE LEBOS, VERACRUZ, MEXICO.
Louisiana State Univ Baton Rouge Coastal Studies Inst
For primary bibliographic entry see Field 8A.
AD-653 039 Not available from CFSTI.

VESIAC MONTHLY BULLETIN OF VELA UNIFORM RESEARCH PUBLICATIONS.
Michigan Univ Ann Arbor Inst of Science and Technology
For primary bibliographic entry see Field 8K.
AD-653 186 HC$3.00 MF$0.65

ROCK DEFORMATION AND THE DEFORMATION MECHANISMS IN TORSION TESTS.
Final rept., 1 Mar 63-28 Feb 67,
Shell Development Co Houston Tex
H. C. Heard. 31 Mar 67, 200p
AFCRL-67-0308
Contract AF 19(628)-2784, ARPA Order-292
Availability: Published in Various reprints.

Descriptors: (*Rock (Geology), *Mechanical properties), (*Single crystals, Mechanical properties), High-temperature research, Strain (Mechanics), Compressive properties, Limestone, Calcite, Quartz, Rock forming minerals, Metamorphic rock, Experimental data, Recrystallization, Twinning (Crystallography), Feldspar, Brittleness, Deformation.

Several different types of triaxial deformation apparatus were employed to deform a variety of common rocks and single crystals at confining pressures to 10 kb, temperatures to 1,000C, and strain rates ranging between 0.001 and 0.0000001/second. Most samples were jacketed in thin metal tubes and tested dry in extension, torsion, compression, or compression plus torsion. Deformation mechanisms ranged from fracture, faulting through intragranular glide to recrystallization, depending on the test environment and rock type. Results of these tests are given.
AD-653 198 Not available from CFSTI.

PLASTIC-TUBE CORING TECHNIQUE FOR UNCONSOLIDATED WET SAND.
Technical rept.,
Yale Univ New Haven Conn Dept of Geology
Daniel E. Shier, and Robert Q. Oaks, Jr. 21 Mar 65, 5p Rept no. TR-9
Contract Nonr-609 (40)
Doctoral thesis. Prepared in cooperation with Shell Oil Co., Houston, Tex., and Esso Production Research Co., Houston, Tex.
Availability: Published in Journal of Sedimentary Petrology p241-4 1966.

Descriptors: (*Sand, Samplers), (*Test equipment, Sand), Geology, Sedimentation, Virginia.
Identifiers: Core sampling.

Cores of unconsolidated wet sand can be obtained by: (1) hammering plastic tubing into sand with a board; (2) filling the remainder of the tube with water and corking the tube to create a vacuum; and (3) pulling the tube, releasing the vacuum, and extruding the core. Depositional structures, concentrations of opaque minerals, differences in oxidation, orientation and preservation of shells, and stratigraphic contacts are strikingly well preserved in the resulting cores. (Author)
AD-653 331 Not available from CFSTI.

MORPHOLOGICAL FEATURES OF HEXAGONAL FERRITES,
Army Electronics Command Fort Monmouth N J Inst for Exploratory Research
For primary bibliographic entry see Field 7B.
AD-653 335 Not available from CFSTI.

MELTING POINTS AT HIGH COMPRESSIONS FROM ZERO-COMPRESSION PROPERTIES THROUGH THE KENNEDY RELATION,
California Univ Los Angeles Dept of Chemistry
For primary bibliographic entry see Field 20M.
AD-653 382 Not available from CFSTI.

APPARATUS TO MEASURE THE MID-INFRARED SPECTRAL EMITTANCE OF COLD POWDERS IN A VACUUM.
California Inst. of Tech., Pasadena. Geological Sciences Div.
C. A. Bauman, and A. F. Goetz. 1965, 12p
NASA-CR-84158
Grant NSG-56

Descriptors: *Infrared instrument, *Measuring apparatus, *Powder, *Spectral emission, Apparatus, Chamber, Cryogenic, Emission, Environment, Infrared, Instrument, Lunnr, Measuring, Silicate, Spectral, Temperature, Vacuum.

For abstract, see STAR 05 14.
N67-26506 HC$3.00 MF$0.65

SUDBURY STRUCTURE, ONTARIO - SOME PETROGRAPHIC EVIDENCE FOR AN ORIGIN BY METEORITE IMPACT.
National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
B. M. French. Feb 67, 59p NASA-TM-X-55789, X-641-67-67

Descriptors: *Canada, *Meteoritic microstructure, *Petrography, Evidence, Formation, Fragment, Geology, Glassy, Impact, Meteorite, Microstructure, Ore, Pressure, Region, Rock, Shock, Temperature.

For abstract, see STAR 03 14.
N67-27574 HC$3.00 MF$0.65

STRATIGRAPHY AND ABSOLUTE AGE OF DEEP-SEA SEDIMENTS IN THE WESTERN PACIFIC.
Academy of Sciences (USSR), Moscow. Soviet Geophysical Committee.
For primary bibliographic entry see Field 8J.
For abstract, see STAR 05 14.
N67-27631 HC$3.00 MF$0.65

8H. HYDROLOGY AND LIMNOLOGY

INFLUENCE OF THE AMAZON RIVER OUTFLOW ON THE ECOLOGY OF THE WESTERN TROPICAL ATLANTIC. I. HYDROGRAPHY AND NUTRIENT CHEMISTRY.
Woods Hole Oceanographic Institution Mass
For primary bibliographic entry see Field 8A.
AD-652 888 Not available from CFSTI.

INFLUENCE OF THE AMAZON RIVER ODTFLOW ON THE ECOLOGY OF THE WESTERN TROPICAL ATLANTIC. II. ZOOPLANKTON ABUNDANCE, COPEPOD DISTRIBUTION, WITH REMARKS ON THE FAUNA OF LOW-SALINITY AREAS.
Woods Hole Oceanographic Institution Mass
For primary bibliographic entry see Field 8J.
AD-653 033 Not available from CFSTI.

WATER DISCHARGE IN THE COLVILLE RIVER, ALASKA, 1962.
Louisiana State Univ Baton Rouge Coastal Studies Inst
For primary bibliographic entry see Field 8L.
AD-653 041 Not available from CFSTI.

EPHEMERAL ESTUARIES OF THE DELTAIC ENVIRONMENT.
Technical rept.,
Louisiana State Univ Baton Rouge Coastal Studies Inst
James P. Morfan. 1967, 7p Rept no. TR-46
Contract Nonr-1575 (03)
Availability: Published in Estuaries American Association for the Advancement of Science p115-20 1967.

Descriptors: (*Estuaries, *Deltas), Terrain, Sedimentation, Rivers, River currents, Beaches, Seacoast, Erosion, Life expectancy, Ocean currents, Tides, Mississippi, India.

The usual definition of the term estuary is not sufficiently inclusive. Most textbook descriptions apply to coastal indentations like the Scandanavian fjords or drowned river mouths like the Chesapeake or Delaware Bays. In addition to these rather obvious illustrations, there are other transitional coastal conditions, including the deltaic environment described here, to which the term estuary is not usually applied. As the word is derived from the Latin aestus referring to 'tides', an estuary will be considered here as any coastal embayment periodically affected by brackish oceanic waters. Because deltaic regions comprise the most dynamic of coastal areas, estuaries associated with this environment are short-lived and are characterized by rapid change. (Author)
AD-653 043 Not available from CFSTI.

ORIGINS OF ESTUARIES.
Technical rept.,
Louisiana State Univ Baton Rouge Coastal Studies Inst
Richard J. Russell. 1967, 7p Rept no. TR-45
Contract Nonr-1575 (03)
Availability: Published in Estuaries American Association for the Advancement of Science p93-9 1967.

Descriptors: (*Estuaries, Sources), Terrain, Oceans, Sedimentation, Deltas, Rivers, Beaches, Seacoast, Erosion, Lakes, River currents, Life expectancy, History.

This report concludes that neither the past nor the future of estuaries gives much promise. Only a few examples have existed during most of the earth's history, and today's estuaries, in many cases, are headed for rapid extinction. Examples are mentioned.
AD-653 044 Not available from CFSTI.

RECENT COASTAL SEDIMENTATION: CENTRAL LOUISIANA COAST.
Technical rept.,
Louisiana State Univ Baton Rouge Coastal Studies Inst
James M. Coleman. 1 Dec 66, 84p Rept no. TR-29, Contrib-66-9
Contract Nonr-1575 (03)

Descriptors: (*Sedimentation, Louisiana), (*Deltas, Sedimentation), Ocean currents, Beaches, Seacoast, Erosion, Estuaries, River currents, Swamps, Plants (Botany), Mexico Gulf, Pelecypoda.

The Recent near-surface sediments of Vermilion, Iberia, and St. Mary Parishes, Louisiana, may be divided into two types: those sediments which were deposited by now abandoned Mississippi River distributaries and those carried along shore and deposited at the delta margins. Changer in delta position during the past 7000 years have resulted in an accumulation of cyclic deposits con-

sisting of detrital sediments separated by in situ peat horizons. The physical, faunal, and floral properties obtained from a study of present-day surface sedimentary environments (nntural levee, nearshore marine, mudflat, oyster reef, beach, marsh, brackish bay, lacustrine, and swamp) were used to interpret subsurface relationships and establish a stratigraphic section. Five laterally continuous peat horizons, now buried at depths ranging from 4 to 40 feet, were identified and indicate that a positive change of level had taken place since their formation. Abundant evidence for a stillstand in sea level during the past 2000 to 5000 years affords a fixed datum for differentiation between eustatic sea level rise and subsidence. The rate of subsidence in the study area is 0.24 foot per century. Using this rate, calculations reveal a eustatic sea level rise of approximately 23 feet in the interval from 7000 to 3650 years BP when stillstand wns reached. There is no indication that sea level was higher than at present during the interval studied. Similar results were obtained by applying this method to published data on sea level changes in the Netherlands, Massachusetts, and Connecticut. (Author)
AD-653 092 HC$3.00 MF$0.65

RADIOISOTOPE GAUGE FOR MONITORING SUSPENDED SEDIMENT CONCENTRATION IN RIVERS AND STREAMS,
Parametrics, Inc., Waltham, Mass.
For primary bibliographic entry see Field 18B.
For abstract, see NSA 20 15.
NYO-2983-1 HC$3.00 MF$0.65

8I. MINING ENGINEERING

UNDER-ICE MINING TBCHNIQUES.
Technical rept.,
Snow Ice and Pgrmafrost Research Establishment Wilmette Ill
John F. Abel, Jr. Jan 61, 86p Rept no. SIPRE-TR-72

Descriptors: (*Cooling, *Mining engineering), Construction materials, Greenland, Costs, Ventilation, Arctic regions, Drilling, Underground structures, Ice, Detonations.

Methods of excavating in the Greenland Ice Cap, and the planning required, equipment employed, and problems encountered are described individually for each of 5 operating seasons (1955-1959), and relative cost evaluations of the different methods are given. Three basic methods were used: hand-picking and manual haulage; explosives and manual haulage (drill-blast-muck cycle); and mechanized mining and haulage. Manual methods, which are of low capacity and limited to widths under 12 ft, are justified only when small openingr are required, and in remote, inaccessible regions. The drill-blast-muck cycle of mining has a slightly higher capacity than manual methods, but requires power to operate the drills and to ventilate after blasting. Explosives can be used for room spans not exceeding 12 ft; when greater spans are excavated by blasting, the resulting roof is unstable. The machine method using mechanized coal mining equipment has the highest capacity and the lowest unit cost. Openings with roof spans in excess of 36 ft have been made with coal mining machines without dangerous roof conditions developing.
AD-652 711 HC$3.00 MF$0.65

8J. PHYSICAL OCEANOGRAPHY

RADIONUCLIDES IN OCEANS AND SEDIMENTS,
Miami Univ Fla Marine Lab
For primary bibliographic entry see Field 8G.
AD-652 743 Not available from CFSTI.

MYSID STATOLITHS IN SHELF SEDIMENTS OFF NORTHWEST NORTH AMERICA,
Northwestern Univ Evanston Ill Dept of Geology
For primary bibliographic entry see Field 8G.
AD-652 746 Not available from CFSTI.

DEEP-SEA pH,
Oregon State Univ Corvallis Dept of Oceanography
Kilho Park. 22 Sep 66, 2p
Contract Nonr-1286 (10), Grant NSF-GP-2232
Availability: Published in Science v154 n3756 p1540-2 Dec 23 1966.

Descriptors: (*Deep water, *pH), Ocean bottom sampling, Sea water, Hydrostatic pressure, Carbonates, Temperature, Silicates, Oceanology, Pacific Ocean.

In the northeastern Pacific Ocean, north of 22 degrees N and east of 180 degrees W, a deep-sea pH maximum of 7.9 exists near 4000 meters. The effect of hydrostatic pressure on the dissociation constants of carbonic acid in sea water appears to be important in its formation. (Author)
AD-652 761 Not available from CFSTI.

A LARGE WATER SAMPLER, RUPTURE-DISC TRIGGERED, FOR STUDIES OF DISSOLVED ORGANIC COMPOUNDS,
Woods Hole Oceanographic Institution Mass
R. C. Clark, Jr., M. Blumer, and S. O. Raymond.
1 Aug 66, 5p Rept no. WHOI-Contrib-1823
Contract Nonr-2196 (00), Grant NSF-GP-3250
Availability: Published in Deep-Sea Research v14 p125-8 1967.

Descriptors: (*Samplers, *Water), (*Organic compounds, *Sea water), Depth indicators, Ocean bottom sampling, Pressure, Filters (Fluid), Capillary tubes, Glass, Contamination, Rupture, Disks.

A variable capacity (1-151.) water sampler is described. It collects, at depth, filtered sea water with minimum organic contamination. It consists of an aluminum pressure case with a glass liner and is equipped with a membrane filter inlet, a capillary flow restrictor and a rupture disc which initiates sampling at a predetermined pressure. This sampler requires no actuation from the surface and contains no moving parts. (Author)
AD-652 763 Not available from CFSTI.

INFLUENCE OF THE AMAZON RIVER OUTFLOW ON THE ECOLOGY OF THE WESTERN TROPICAL ATLANTIC. II. ZOOPLANKTON ABUNDANCE, COPEPOD DISTRIBUTION, WITH REMARKS ON THE FAUNA OF LOW-SALINITY AREAS.
Technical rept.,
Woods Hole Oceanographic Institution Mass
George W. Calef, and George D. Grice. 13 Sep 66, 15p Rept no. WHOI-Ref-67-18, WHOI-Contrib-1813
Contract N00014-66-C-0241, Grant NSF-GB-3479
Research supported in part by AEC.
Availability: Published in Journal of Marine Research v25 n1 p84-94 1967.

Descriptors: (*Plankton, *Atlantic Ocean), (*Rivers, *Ecology), Oceanographic data, Periodic variations, Hydrographic surveying, Ocean bottom sampling, Salinity, River currents, Tropical regions, Surface properties, Temperature.

Zooplankton samples and hydrographic data were collected on two cruises to the area of the equatorial Atlantic that is influenced by the Amazon River outflow: one cruise during the dry season, October and November 1964, the other during the wet season that followed, May and June 1965. In the area where the cruise tracks overlapped, the average displacement volume of total zooplankton was almost three times higher during the wet season than during the dry season. The average number of copepods per cubic meter of water showed a similar increase. Copepods totaling 150 species were identified; these included 128 Calanoida, 17 Cyclopoida, and 5 Harpacticoida. Several copepod species were ubiquitous in the area studied. The copepod fauna became more diverse during the wet season as indicated in the vertical collections by an increase in the average number of species per station. Large lenses of low-salinity water were located several hundred miles north of the river mouth on both cruises. The fauna of these offshore lenses was characterized by extensive populations of two coastal species: Evadne tergestina (a cladoceran) and Lucifer faxoni (a decapod). (Author)
AD-653 033 Not available from CFSTI.

A ONE-DIMENSIONAL MODEL OF THE SEASONAL THERMOCLINE. I. A LABORATORY EXPERIMENT AND ITS INTERPRETATION.
Technical rept.,
Woods Hole Oceanographic Institution Mass
J. S. Turner, and E. B. Kraus. 11 Oct 65, 13p
Rept no. WHOI-Ref-67-17, WHOI-Contrib-1716
Contract N00014-66-C-0241, Grant NSF-GP-317
Availability: Published in Tellus XIX n1 p88-97 1967.

Descriptors: (*Thermoclines, *Periodic variations), Models (Simulations), Theory, Mechanical properties, Heat, Kinetic energy, Rotation, Surface properties, Oceans, Depth finding, Temperature, Density, Laboratories, Potential energy, Tests.

A simple model of the seasonal thermocline is examined theoretically and with the aid of a laboratory experiment. It is argued that all the heat and mechanical energy which affect the water column can be put in near the surface and propagated downwards, without being influenced significantly by horizontal velocities, advection or rotation. If all the kinetic energy of stirring is used to change the potential energy of the system, one can calculate the temperature and depth of the well-mixed surface layer as a function of time, given the heat input. This has been done explicitly for a sawtooth seasonal heating function and constant stirring rate. A step-by-step heating process has been simulated by an intermittent input of buoyant fluid at the surface, both theoretically and experimentally. Many features observed in the ocean are reproduced by both the theory and the experiments. The depth and temperature dependence of the upper mixed layer as functions of time, and the relation to the heating and cooling cycle, are in good qualitative agreement. Most important, this model shows clearly that surface mixing affects only the properties down to the topmost density interface, and that deeper features laid down early in the heating season can persist until the well-mixed layer reaches them again late in the winter. (Author)
AD-653 034 Not available from CFSTI.

BEACH CHANGES ON THE OUTER BANKS OF NORTH CAROLINA.
Louisiana State Univ Baton Rouge Coastal Studies Inst
For primary bibliographic entry see Field 8C.
AD-653 040 Not available from CFSTI.

DIRECTIVITY OF RECEIVED OCEAN NOISE.
Technical rept.,
Bell Telephone Labs Inc Whippany N J
E. N. Gilbert. 3 Jan 67, 17p Rept no. TR-1
Contract N00014-66-C-0005

Descriptors: (*Noise, *Oceans), Intensity, Theory, Surface properties, Velocity, Depth indicators, Mathematical analysis, Energy, Ocean bottom, Probability, Deep water, Time, Heat, Oceanographic data.

Group 8J—Physical oceanography

At a point under the ocean the noise intensity received from ships and waves on the surface has a directivity pattern which could be observed by a directive receiving array. The report derives simple theoretical formulas for the mean noise intensity pattern or, equivalently, the average pattern over a long period of time. The derivations use ray propagation theory. They assume an ocean with plane surface and bottom and with propagation velocity depending on depth only. Noise sources have constant probability density over the surface. To use the formulas it is not necessary to trace rays, except to include the effect of dissipation of sound energy into heat. This dissipation, although small, has an important influence on the directivity pattern in some cases. A numerical example is included for a deep ocean that exhibits a sound channel at 666 fathoms. (Author)
AD-653 102 HC$3.00 MF$0.65

CORRECTION FOR BROMIDE DURING CHLORIDE TITRATION OF SEA-ICE BRINE.
Snow Ice and Permafrost Research Establishment Wilmette Ill
For primary bibliographic entry see Field 8L.
AD-653 133 HC$3.00 MF$0.65

A STUDY OF THE LOOP CURRENT IN THE EASTERN GULF OF MEXICO.
Texas A and M Univ College Station Dept of Oceanography
For primary bibliographic entry see Field 8C.
AD-653 268 HC$3.00 MF$0.65

SYNOPTIC ANALYSIS OF NEAR SURFACE AND SUBSURFACE TEMPERATURES IN THE ATLANTIC OCEAN FOLLOWING HURRICANE BETSY.
Master's thesis,
Texas A and M Univ College Station Dept of Oceanography
Robert C. Landis. Dec 66, 48p Rept no. Ref-66-30T
Contract Nonr-2119 (04)
Prepared in cooperation with the U. S. Naval Oceanographic Office.

Descriptors: (*Surface temperatures, *Atlantic Ocean), Sea water, Thermal properties, Storms, Temperature, Bathythermographs, Ocean bottom, Surface-to-underwater, Tropical cyclones, Maps, Oceanographic data, Tables.

Data from sea surface temperature and bathythermograph radio messages are utilized in analyzing the thermal change in the Atlantic Ocean during the passage of Hurricane Betsy, 1965. Seven-day average sea surface temperature patterns show changes of 4 F in the wake of the hurricane, where upwelling is shown to have taken place. Two temperature sections based on observations made before and after the storm passage are composed across the hurricane path. The first temperature section, taken one week after storm passage, indicates upwelling from the depth of 200 feet. The second section, representing three weeks after storm passage, shows upwelling to have occurred but because of the time lag between storm passage and BT observation, much of this area has mixed and has been advected slightly to the north. In addition, the second section clearly shows an area of downwelling. Magnitudes of the thermal changes are shown by computations of the change in heat content for a square centimeter column of water. Results of the analyses compare favorably to previous studies based on research data and may be of use to the oceanographic forecaster. (Author)
AD-653 270 HC$3.00 MF$0.65

A MEASUREMENT OF OCEAN-BOTTOM SLOPE.
Research rept.,
Navy Underwater Sound Lab New London Conn
Howard S. Newman. 27 Apr 67, 55p Rept no. USL-820

Descriptors: (*Ocean bottom, *Measurement), Deep water, Reverberation, Oceanology, Recording systems, Oscillographs, Depth indicators, Surface properties, Reflection, Underwater sound, Echo ranging, Signals, Targets, Design, Tables, Data processing systems, Errors, Geometry, Velocity, Detection.

The slope of the deep ocean bottom is calculated by measuring the bottom reverberation from active sonar transmissions. Knowledge of this slope is required to localize a target detected by bottom bounce echo-ranging. The method is based on the fact that reverberation has a space-time coherency; that is, bottom reverberation has a directionality that changes with time, and the rate of this change is a function of bottom slope. A sea test was conducted to measure one coordinate of bottom slope. The test consisted of transmitting on sequential target bearings, then tape recording the resulting reverberation as seen at the output of a vertically split array. The tapes were reduced in the laboratory by playing the split-beam signals into a bearing deviation indicator (BDI) and recording the output on an optical oscillograph. For short transmission lengths, the data showed that the expected coherency is present; however, the measurements of the bottom slopes were not in close agreement with fathometer measurements. It is believed that the discrepancy is a result of the interfering surface reflection of the bottom reverberation. (Author)
AD-653 286 HC$3.00 MF$0.65

COMPARISON OF THEORETICAL OCEAN DIFFUSION MODELS,
Naval Radiological Defense Lab San Francisco Calif
For primary bibliographic entry see Field 6R.
AD-653 288 HC$3.00 MF$0.65

A ONE-DIMENSIONAL MODEL OF THE SEASONAL THERMOCLINE II. THE GENERAL THEORY AND ITS CONSEQUENCES.
Technical rept.,
Woods Hole Oceanographic Institution Mass
E. B. Kraus, and J. S. Turner. 11 Oct 65, 12p Rept no. WHOI-Ref-67-24, WHOI-Contrib-1717
Contract N00014-66-C-0241, Grant NSF-GP-317
Availability: Published in Tellus v19 n1 p98-106 1967.

Descriptors: (*Thermoclines, Theory), Convection (Heat transfer), Diurnal variations, Oceanology, Periodic variations, Surface temperatures, Oceans, Surface properties, Kinetic energy, Surface-to-underwater, Equations, Heat, Cooling, Depth indicators, Solar radiation, Mathematical analysis, Sea water.

A theory of the layer formation due to surface process is presented, which is more general than that used in the preceding paper I. Convection due to heating at depth and cooling at the surface is included, as well as the mechanical stirring due to wind action. The theory is applicable to arbitrary forms of heating, including intermittent or continuous processes, and could be used to investigate diurnal as well as seasonal effects. A detailed application is made to the case treated approximately in I, for which a solution is now obtained in analytic form. The results obtained allow a quantitative, as well as qualitative, comparison with the ocean. It is found that reasonable layer depths are predicted using measured heating rates, and a value of the turbulent kinetic energy input to the water reduced from the mean surface stress. The effects of heating at depth can be comparable with wind stirring, even when the temperature of the upper layer is increasing. During the winter, convection due to surface cooling dominates the process which deepen the layer. (Author)
AD-653 371 Not available from CFSTI.

STRATIGRAPHY AND ABSOLUTE AGE OF DEEP-SEA SEDIMENTS IN THE WESTERN PACIFIC.
Academy of Sciences (USSR), Moscow. Soviet Geophysical Committee.
V. I. Baranov, P. L. Bezrukov, L. A. Khristianova, and E. A. Romankevitch. 1966, 171p REPT.-14
in Russian, English Summary

Descriptors: *Lithology, *Pacific ocean, *Sediment, *Stratigraphy, Age, Bibliography, Chemical, Composition, Core, Determination, Element, Layer, Oceanography, Quaternary, Radioactivity, Sea, Water.

For abstract, see STAR 05 14.
N67-27631 HC$3.00 MF$0.65

A COMPILATION OF OBSERVATIONS FROM MOORED CURRENT METERS AND THERMOGRAPHS. VOLUME I: OREGON CONTINENTAL SHELF, JULY 1965-FEBRUARY 1966,
Oregon State Univ., Corvallis. Dept. of Oceanography.
Curtis A. Collins, H. Clayton Creech, and June G. Pattullo. Dec 66, 43p Data rept-23, Ref-66-11
Grant NSF-GP-4472

Descriptors: (*Oceanographic data, Continental shelves), (*Continental shelves, Oregon), Ocean currents, Velocity, Oceanographic equipment, Anchors (Marine), Mooring buoys, Floats, Instrumentation.

This is the first data report of a program designed to study physical processes in Oregon shelf waters by means of moored instrument arrays. Various statistics and plots of smoothed data are presented for time series of current velocity and of temperature. Data were collected in July, August, September, and October of 1965 and in January and February of 1966.
PB-173 933 HC$3.00 MF$0.65

8K. SEISMOLOGY

INVESTIGATIONS ON THE NONELASTIC BEHAVIOR OF THE UPPER MANTEL.
Annual summary rept. no. 1, 1 May 65-30 Apr 66, Technische Hochschule, Karlsruhe (West Germany). Geophysikalisches Institut.
Stephan Mueller, and Karl Fuchs. 20 May 66, 60p AFOSR-66-1835
Contract AF 61 (052)-861

Descriptors: (*Seismic waves, Spectroscopy), Attenuation, Earth (Planet), Europe, West Germany, Velocity, Elasticity.

A procedure for the spectral analysis of seismic body waves is discussed. The specific attenuation factor may only be derived after properly correcting for the effects of instrumental distortion, of the receiver and source crust, the propagation effect in the upper mantle and the source spectrum. Response curves for 5 different seismograph systems are presented. The crust is approximated by a flat layer model. The transfer function for the system of a point source in the crust was derived for three basic types: an explosive source, a single couple and a double couple. The explosive type of point source appears to be more suited for attenuation studies since the source spectrum is simpler than spectra of more complicated source types. (Author)
AD-641 312 HC$3.00 MF$0.75

SPECTRA OF FREE OSCILLATIONS FROM AN AFTERSHOCK SEQUENCE,
Massachusetts Inst of Tech Cambridge Dept of Geology and Geophysics

Frank Press. 1 Aug 66, 13p
Contract AF 49 (638)-1632, ARPA Order-292
Availability: Published in Unidentified journal.

Descriptors: (*Shock waves, Periodic variations), (*Seismic waves, Periodic variations), Earthquakes, Probability, Seismology, Chile, Alaska.

The question arises as to whether the spectrum of oscillations generated by a main shock and its aftershock sequence differs from that of a single event. It is shown that a formal difference occurs if the probability of the occurrence of an aftershock and its magnitude are functions of time. When applied to an actual aftershock sequence, the discrepancy in frequency of the spectral peak is probably less than .01 minutes, although some skewing in the shape of the spectrum may occur. (Author)
AD-652 854 Not available from CFSTI.

P WAVE DIFFRACTION THEORY AND THE STRUCTURE OF THE CORE-MANTLE BOUNDARY,
Princeton Univ N J Dept of Geology
Robert A. Phinney, and Shelton S. Alexander. 24 Jun 66, 20p
AFOSR-67-1189
Contract AF 49 (638)-1243, Grant NSF-GP-579
Availability: Published in Journal of Geophysical Research v71 n24 p5959-75 Dec 15 1966.

Descriptors: (*Seismic waves, Diffraction), (*Structural geology, Seismic waves), Mechanical waves, Scattering, Theory, Attenuation, Resonance, Interfaces, Mathematical models.
Identifiers: Core (Earth), Mantle (Geology).

The theory for diffraction of elastic waves in a spherical geometry is reviewed and modified to apply to a multilayer geometry. Numerical calculations were made of the attenuation function for P waves in the shadow of the core for certain basic geometries and for models which have a single layer at the core-mantle boundary. Resonance phenomena due to the presence of the layer are discussed, and an attempt is made to explain observed peaks in the attenuation spectrum for various regions of the core boundary. A region between 30 and 160 km thick, with a reduced shear velocity and an increased density, appears to be the most likely explanation of the data. (Author)
AD-652 915 Not available from CFSTI.

LA MAGNITUD SISMICA V EL COEFFICIENTE DE ABSORCION ESPECIFICA EN LA PENINSULA IBERICA (The Seismic Magnitude and the Coefficient of Absorption in the Iberian Peninsula Region),
Instituto Geografico Y Catastral Madrid (Spain)
J. M. Munuera. Jul 66, 19p
AFOSR-67-1200
Contract AF 61 (052)-657
Text in Spanish.
Availability: Published in Revista de Geofisica v24 n96 p313-28 Oct-Dec 1966.

Descriptors: (*Earthquakes, Seismology), Spain, Portugal, Absorption, Calibration.

The magnitude scale used by Spanish Seismological Survey (SSS) for near earthquakes inside the area 5 deg. E.-10 deg. W., 35 deg -44 deg. N., was deduced from shear waves and with an explicit term for the specific absorption. The way for computing this coefficient is the difference between a theoretical expression for log E and other empirical one, which was previously determined for the Toledo Observatory. The method requests this base-station, besides the new standard calibration made for the other four stations handled and also abundant events and the corresponding m values which were preliminary deduced by Laboratorio Central del Servicio de Sismologia (LCSS), Madrid, since 1961 up to 1964. (Author)
AD-652 971 Not available from CFSTI.

NUMERICAL EXPERIMENTS IN THE ESTIMATION OF FREQUENCY-WAVENUMBER SPECTRA OF SEISMIC EVENTS USING LINEAR ARRAYS,
Texas Instruments Inc Dallas
A. Frank Linville, and Stanley J. Laster. 5 May 66, 22p
AFOSR-67-1201
Contract AF 49 (638)-1244
Availability: Published in Bulletin of the Seismological Society of America v56 n6 p1337-55 Dec 1966.

Descriptors: (*Seismic waves, Numerical analysis), Mechanical waves, Frequency, Distribution, Rayleigh waves, Mathematical models, Power spectra.

Studies in the measurement of frequency-wavenumber spectra of transient events have been conducted using theoretical and analog model data recorded along a 21-element, inline array. Straightforward numerical transformation, assuming space stationarity, gives good definition of the dominant (Rayleigh) mode, but little information concerning higher modes. The presence of spatial nonstationarity due primarily to cross correlation between modes complicates the fine structure of the spectral estimate. Averaging over redundant space lags is necessary to remove this. Additional difficulties arise from side lobes due to use of the finite length array. The amplitude of the side lobes can be reduced by using a space lag window. In the present case this gives indications of the higher modes, but these indications are so ill-defined as to be useless for determining dispersion. The effects of amplitude deviations between channels are also studied. (Author)
AD-652 973 Not available from CFSTI.

PHASE VELOCITY OF SURFACE WAVES IN THE TRANSITION ZONE OF CONTINENTAL MARGINS. I. LOVE WAVES,
California Univ Los Angeles Inst of Geophysics and Planetary Physics
L. Knopoff, and A. K. Mal. 26 Sep 66, 8p Rept no. Pub-530
Grant AF-AFOSR-710-65
Availability: Published in Journal of Geophysical Research v72 n6 p1769-76 Mar 15 1967.

Descriptors: (*Seismic waves, Phase measurement), Boundary value problems, Scattering, Mountains, Energy, Wave transmission, Reflection, Lithosphere, Mohorovicic discontinuity.
Identifiers: Love wave.

The phase velocity of surface waves in the transition zone of a thickening layer is found to be severely influenced by back reflections from the structure beyond the seismic observatory. This feature is more important in producing phase shifts than is the shift in the eigenvalue due to the inclined geometry. The effect of an inclined upper surface and an inclined Moho on the phase velocities of Love waves in a single layer are computed. For surface waves traveling from the thinner to the thicker layer, the upper surface produces no calculable effect. For both directions of propagation for an inclined Moho and for propagation from the thicker to the thinner layer for an inclined upper surface, the effect is a maximum in the period range 25 to 45 sec and has a phase shift whose sign is undeterminable in the absence of precise information about the geometry. (Author)
AD-653 028 Not available from CFSTI.

VESIAC MONTHLY BULLETIN OF VELA UNIFORM RESEARCH PUBLICATIONS.
Michigan Univ Ann Arbor Inst of Science and Technology
15 Mar 67, 18p Rept no. VESIAC Bull-50
See also AD-649 506.

Descriptors: (*Seismology, Periodicals), Bibliographies, Abstracts, Seismic waves, Earthquakes, Structural geology.

The listing contains abstracts of seminnual, annual, and final reports; technical notes, and journal articles resulting from VELA Uniform sponsored research.
AD-653 186 HC$3.00 MF$0.65

STUDY OF LASA DATA LINKS.
Rept. for 1 Jul-1 Nov 66,
Philco-Ford Corp Blue Bell Pa Communications and Electronics Div
Don R. Fink, and Robert S. Dahlberg. Mar 67, 64p
ESD-TR-67-221
Contract AF 19 (628)-6141, ARPA Order-800

Descriptors: (*Seismological stations, *Data processing systems), Digital computers, Programming Computers), Feasibility studies, Costs, Teletype systems, Data storage systems, Seismic waves, Montana, Tables.

Investigation has been directed toward the utilization of data links for dissemination of seismic information from the Montana Large Aperture Seismic Array (LASA) to the scientific community. Methods and equipments are readily available for providing an essentially on-line seismic data link between Montana LASA and potential data users. Analog and/or digital data transmission appears feasible, and relative requirements and costs per data channel have been detailed. As a result of the study, which included a survey of the seismological community, it is recommended that a teletype station bulletin be made available to those desiring it. It is also recommended that consideration be given to providing a data transmission facility at the Montana LASA Data Center so that data can be transmitted directly to interested users. In addition, recommendation is made to investigate possible alternative approaches for mass storage of seismic data. (Author)
AD-653 223 HC$3.00 MF$0.65

FREE OSCILLATIONS, AFTERSHOCKS, AND Q,
Massachusetts Inst of Tech Cambridge Dept of Geology and Geophysics
Frank Press. 1966, 6p
AFOSR-67-1228
Contract AF 49 (638)-1632
See also AD-652 854.
Availability: Published in Geophysical Monograph n10 p498-501 1966.

Descriptors: (*Shock waves, Oscillation), Seismic waves, Earthquakes, Seismology, Chile, Alaska.

The question whether free oscillations are prolonged by aftershocks, leading to systematic overestimates of Q, is explored. The aftershock sequences for the Chilean earthquake of 1760 and the Alaskan earthquake of 1964 were used in a program that estimates energy decay for the entire sequency of main shocks and aftershocks. If it is assumed that the relative excitation of free oscillations is determined by the relative energy in the aftershock, then systematic errors occur in a Q range and for modes that are significant in recent estimates of Q in the mantle. It is pointed out that the bottom of the low-Q zone of the upper mantle is much deeper than 400 km under this assumption and may be as deep as 700 km. (Author)
AD-653 323 Not available from CFSTI.

8L. SNOW, ICE, AND PERMAFROST

GLACIOLOGICAL INVESTIGATIONS, NUNATARSSUAQ ICE RAMP, NORTHWESTERN GREENLAND.

Technical rept.,
Northwestern Univ Evanston Ill
Laurence H. Nobles. May 60, 79p
SIPRE-TR-66
Contract DA-11-190-eng-12

Descriptors: (*Ice, Terrain), (*Glaciers, Greenland), Arctic regions, Snow, Wind, Ablation, Velocity, Climatology, Snow, Degradation.

The margin of the ice cap in northwestern Greenland is formed by a relatively thin ice carapace resting on a very rugged sub-ice togography. The Nunatarssuaq ice ramp is a gently sloping ice mass approximately 4 miles long by 2 miles wide that forms part of this margin 30 miles northeast of Thule. The ice of the Nuna ramp is of subpolar type, in which negative temperatures prevail throughout most of the year in all but the upper few feet. At a depth of 25 ft the ice temperature is constant throughout the year at -14C; only the upper 2-3 ft of ice is at 0C by the end of the melt season. Thus the temperature regimen of this high-polar ice is strictly analagous to that of perennially frozen ground. All runoff is on the surface, forming such surface features as slush avalanches, algal pits, and an integrated drainage pattern. Net accumulation as high as 25 in. of water equivalent was measured at Morris Station, 30 miles from the border of the ice cap, but most of the Nuna ramp proper is blown free of snow in winter by strong winds. Ablation of 20 to 25 in. of water during the melt season is common on the lower Nuna ramp. The most severe ablation is on days of moderately high temperature accompanied by moderate winds. The firn limit on the ramp is at about 3000 ft elevation. Comparison between the total amount of ice ablated from the lower ramp and the amount delivered to the ramp by flow through the gap south of Nuna Knob indicates a strongly negative budget balance for the ramp during the period studied.
AD-652 709 HC$3.00 MF$0.65

SNOW STABILIZATION USING DRY PROCESSING METHODS.
Technical rept.,
Snow Ice and Permafrost Research Establishment Wilmette Ill
Albert F. Wuori. Jul 60, 26p Rept no. SIPRE-TR-68

Descriptors: (*Snow, *Vibrators (Mechanical)), Stabilization, Greenland, Effectiveness, Density, Runways, Construction, Aircraft landings, Hardness.

Experiments were made with several methods of dry processing and compacting snow on the Greenland Ice Cap. The Peter snow miller was used to process the snow initially, followed by compaction with vibratory compactors, rollers, and a D-8 tractor. The vibration frequency was found to have some effect on the degree of compaction with the vibratory compactors. Better results were obtained by precompacting with a roller before vibration. The best compaction was obtained using a D-8 tractor with low ground pressure tracks to compact the freshly processed Peter snow. Tests show that this method of processing may be adequate to produce a snow surface and base structure capable of supporting certain types of aircraft.
AD-652 710 HC$3.00 MF$0.65

UNDER-ICE MINING TECHNIQUES.
Snow Ice and Permafrost Research Establishment Wilmette Ill
For primary bibliographic entry see Field 8I.
AD-652 711 HC$3.00 MF$0.65

PERMAFROST TUNNEL, CAMP TUTO, GREENLAND.
Technical rept.,
Snow Ice and Permafrost Research Establishment Wilmette Ill
John F. Abel, Jr. Oct 60, 27p Rept no. SIPRE-TR-73

Descriptors: (*Underground structures, Greenland), (*Military facilities, Arctic regions), Permafrost, Soils, Classification, Geology, Drilling, Costs, Feasibility studies.
Identifiers: Camp TUTO.

An experimental tunnel, 300 x 9 ft, was driven into a glacial till hillside near Camp TUTO during the summer of 1959 for the purposes of determining the feasibility of excavating subsurface openings in frozen glacial till, developing efficient methods for excavating this material, and determining the characteristics of the glacial till at depth. Excavation of frozen glacial till by conventional hard-rock mining methods, modified slightly to allow for low temperatures, was found to be feasible. The employment, effectiveness, and possible improvement of the mining methods and equipment are discussed and problems for future study are suggested.
AD-652 712 HC$3.00 MF$0.65

CUT-AND-COVER TRENCHING IN SNOW.
Technical rept.,
Snow Ice and Permafrost Research Establishment Wilmette Ill
R. W. Waterhouse. Jul 60, 20p Rept no. SIPRE-TR-76

Descriptors: (*Construction materials, *Snow), (*Shelters, Greenland), Roofs, Walls, Arctic regions, Milling machines, Density, Military engineering, Hardening, Underground structures.

During 1955 and 1956 a technique was developed and tested in Greenland for making snow-arch covered trenches designed for use as subsurface military shelters and communication ways on the Ice Cap. The initial installation consisted of a trench 8 ft wide and 10 ft deep over which an arched snow cover was formed on a removable steel form system. A track-mounted Swiss snow-milling machine driven by a gasoline engine was used in both the trench-cutting and roof forming operations. Five hundred feet of covered trench was formed and instrumented to gage the time deformation and closure rate of the cavity. A sequence of photographs are included to show details of the construction technique. The appendix contains details of the snow forms.
AD-652 713 HC$3.00 MF$0.65

EXCAVATIONS IN FROZEN GROUND. IGLOO FOXHOLES.
Technical rept.,
Snow Ice anu Permafrost Research Establishment Wilmette Ill
Robert Benert. Sep 60, 19p Rept no. SIPRE-TR-77

Descriptors: (*Permafrost, *Earth-handling equipment), (*Explosive materials, *Blast), Cratering, Feasibility studies, Drilling, Site selection, Explosions, Soils, Snow.

Tests were conducted near Houghton, Mich., in December 1954 to determine the feasibility of producing man-sized cavities beneath the frozen ground layer. Charges from 0.1-10 lb of low-velocity explosives (Coalite 7S and Gelodyn 1) were fired at depths from 10.5-48 in. in ground frozen to a depth of 6-24 in. The development of these igloo-shaped foxholes by explosive is not recommended since it is not possible to predict accurately the amount of explosive required and the igloo shape is not suitable for comeat areas. However, 1 to 2 lb of Coalite 7S is sufficient to produce a 24-in. diam crater in ground frozen to a depth of 1 to 2 ft. The crater can be enlarged easily by excavating the underlying thawed ground.
AD-652 714 HC$3.00 MF$0.65

EXCAVATIONS IN FROZEN GROUND. CRITICAL DEPTH SHOTS (100 AND 500 LB) IN FORT CHURCHILL TILL.
Technical rep t.,
Snow Ice and Permafrost Research Establishment Wilmette Ill
Robert Benert. Jan 61, 13p Rept no. SIPRE-TR-79

Descriptors: (*Charges (Explosive), Mathematical prediction), (*Explosive materials, Cratering), Drilling, Mapping, Silt, Cracks, Explosions, Rock (Geology), Permafrost.

Tests were conducted from February to March 1956 at Fort Churchill (Canada) to determine if the critical depth curve obtained earlier for small charges (0.5-20 lb) could be extrapolated for larger charges. The results, based on firings of three 100-lb and four 500-lb charges of Atlas 60% gelatin dynamite, indicate that the definition for critical depth must be revised for the larger charges if the extrapolation is to be valid.
AD-652 715 HC$3.00 MF$0.65

BASES AND FOUNDATIONS.
Technical translation.
National Research Council of Canada Ottawa (Ontario) Div of Building Research
N. I. Saltykov, and G. V. Porkhaev. 1967, 103p
Rept no. NRC-DBR-156
NRC-TT-1266, TT-67-62057
Osnovaniya i Fundamenty, trans. of mono. Osnovy Geokriologii (Merzlotovedeniya), Chast Vtoraya, Inzhenernaya Geokriologiya, Moscow, 1959 p140-218. See also AD-652 774.

Descriptors: (*Foundations (Structures), Construction), (*Permafrost, Preservation), Stability, Performance (Engineering), Soils, Loading (Mechanics), Walls, Freezing, Adhesion.
Identifiers: Geocryology.

The authors review the design, construction and maintenance of foundations in permafrost regions and engineering aspects of the perennially frozen foundation soils. The various methods of constructing foundations in permafrost are: designing for preservation of the permafrost, designing for gradual thawing of the permafrost with possible differential settlement of the foundation soils, designing for preconstruction thawing of the permafrost. Measures to counteract the effects of heaving in the seasonally thawed layer above the permafrost are also discussed.
AD-652 773 HO$3.00 MF$0.65

USE OF ICE, SNOW AND FROZEN SOIL IN ENGINEERING STRUCTURES.
Technical translation,
National Research Council of Canada Ottawa (Ontario) Div of Building Research
K. F. Voitkovskii, and M. M. Krylov. 1967, 23p
Rept no. NRC-DBR-157
NRC-TT-1267, TT-67-62058
Ispolzovanie lda, Snega i Merzlykh Gruntov dlya Stroitelstva Inzhenernykh Sooruzhenii, trans. of mono. Osnovy Geokriologii (Merzlotovedeniya), Chast Vtoraya, Inzhenernaya Geokriologiya, Moscow, 1959 p267-83. See also AD-652 775.

Descriptors: (*Construction materials, Buildings), (*Permafrost, Structures), Snow, Ice, Climatology, Soil mechanics, Stability, Mechanical properties, Recrystallization.
Identifiers: Geocryology.

This translation reviews the use of ice, snow and frozen soil as construction materials in permafrost regions. The design and construction of engineering structures of snow, ice and frozen soil are des-

cribed. The chapter concludes with a discussion of the construction and operation of ice-walled storehouses.
AD-652 774 HC$3.00 MF$0.65

NEW AND IMMEDIATE PROBLEMS IN ENGINEERING GEOCRYOLOGY.
Technical translation,
National Research Council of Canada Ottawa (Ontario)
N. I. Saltykov. 1967, 17p Rept no. NRC-DBR-160
NRC-TT-1276, TT-67-62059
Novye Problemy i Blizhaishie Zadachi Inzhenernoi Geokriologii, trans. of mono. Osnovy Geokriologii (Merzlotovedeniya), Chast Vtoraya, Inzhenernaya Geokriologiya, Moscow, 1959 p348-57. See also AD-652 773.

Descriptors: (*Permafrost, Structures), (*Foundations (Structures), Construction), Specifications, Stability, Soils, Ice, Mechanical properties, Civil engineering, Drainage, Thermal properties, Rock (Geology), Maintenance, Freezing.
Identifiers: Geocryology.

Report lists current existing gapr in engineering research and practice related to permafrost problems. New problems arising in controlling the thermal and mechanical interactions between engineering structures and the ground in permafrost regions are discussed.
AD-652 775 HC$3.00 MF$0.65

FEASIBILITY STUDY OF BURIED ANCHORS IN POLAR SNOW.
Special rept.,
Cold Regions Research and Engineering Lab Hanover N H
Austin Kovacs. Mar 67, 47p Rept no. CRREL-SR -107

Descriptors: (*Anchors (Structural), *Loading (Mechanics)), (*Foundations (Structures), *Creep strength), Snow, Hardness, Greenland, Construction materials, Metal plates, Test equipment, Cracks, Feasibility studies, Rupture, Failure (Mechanics), Polar regions.

The load resistance behavior of buried anchors in polar snow was investigated to determine the feasibility of using them as part of a reaction system for containing the forces generated by pile test loading devices. The test program was conducted at Camp Century, Greenland. Ten anchors were load-tested: eight in quick extraction and two under sustained long-term extraction. Ultimate load capacities of the anchors to resist quick extraction forces and their ability to hold sustained loads have not been definitely established, and no mathematical solution has been brought forward to predict the unit load creep rate or the ultimate load vs. embedment depth of an anchor in snow. The results of this exploratory study established the feasibility of using buried anchors in polar snow for the pile test program.
AD-652 869 HC$3.00 MF$0.65

ICE SURFACE MOVEMENT ON THE TUTO RAMP IN NORTH GREENLAND.
Technical rept.,
Cold Regions Research and Engineering Lab Hanover N H
R. M. Davis. Mar 67, 34p Rept no. CRREL-TR-164

Descriptors: (*Ice, Greenland), (*Glaciers, Arctic regions), Roads, Construction, Surfaces, Triangulation, Performance (Engineering), Surveying, Permafrost, Tables, Ablation, Terrain.
Identifiers: Tuto ramp.

As part of a study of road conrtruction on glacier ice, a program of measurements of the horizontal and vertical movement of the surface of the ice has been conducted. This report covers measurements from 1956 through the 1963 thaw season. The measurement procedure is described, and the movement data are tabulated. Appendixes A and B present short-term horizontal movement measurements and station elevations, respectively. The rate and direction of both the vertical and horizontal movement on the Tuto ramp are fairly consistent on an annual basis. The upward vertical movement from Station 20+00 to 58+00 on the original Ramp Road is probably caused by the ice upthrust over a stagnant wedge of ice at the edge of the glacier. The existence of thir wedge is evidenced by the small amount of horizontal movement at the edge of the glacier and the upward vertical movement of the ice in the area in front of the wedge.
AD-652 870 HC$3.00 MF$0.65

HEAT CONDUCTION IN MOIST POROUS MEDIA.
Research rept.,
Cold Regions Resenrch and Engineering Lab Hanover N H
Yin-Chao Yen. Dec 66, 17p Rept no. CRREL-RR-212

Descriptors: (*Snow, Thermal conductivity), Density, Water vapor, Diffusivity, Porous materials, Moisture.

An equation has been developed to describe heat conduction in moist porous media. Specific examples are given to demonstrate the effect of dry medium density and water vapor diffusivity through the medium on the rate of temperature propagation in snow. (Author)
AD-652 872 HC$3.00 MF$0.65

WATER DISCHARGE IN THE COLVILLE RIVER, ALASKA, 1962.
Technical rept.,
Louisiana State Univ Baton Rouge Coastal Studies Inst
Lennart Arnborg, H. J. Walker, and Johan Peippo. 1966, 17p Rept no. TR-47
Contract Nonr-1575 (03)
Availability: Published in Geografiska Annaler v48 serA p195-210 1966.

Descriptors: (*Rivers, *Alaska), (*Water, Measurement), Ice, Oceans, Permafrost, Hydrology, Drainage, Floods, Periodic variations, Surface properties, Arctic regions.

The report, based on field work along the Colville River, Alaska, presents hydrological characteristics of the surface drainage in an area of continuous permafrost on the Arctic Slope. Water discharge was determined for the river delta during the whole hydrological year, which in 1962 lasted from May 25 to about October 20. During this period the discharge started from zero and reached about 6000 cu m/s during the flood at the beginning of June. The total water discharge during the year was 16 x 10 to the 9th power cu m with an average of 26 l/s sq km for the hydrological year or 10 l/s sq km for the entire year. (Author)
AD-653 041 Not available from CFSTI.

CORRECTION FOR BROMIDE DURING CHLORIDE TITRATION OF SEA-ICE BRINE.
Special rept.,
Snow Ice and Permafrost Research Establishment Wilmette Ill
A. Assur. Jan 60, 6p Rept no. SIPRE-SR-35

Descriptors: (*Sea ice, *Volumetric annlysis), (*Chlorides, Sea ice), Bromides, Chemical precipitation, Errors, Sea water, Salinity, Concentration (Chemistry).

A correction factor for bromine during chlorine-titration of sea ice brine is established. A table of values as a function of brine freezing point is included. The corrections were applied to obtaining the chloride concentration of brines from sea ice at different temperatures.
AD-653 133 HC$3.00 MF$0.65

SNOW DENSIFICATION THEORY AND ITS ENGINEERING APPLICATION.
Research rept.,
Snow Ice and Permafrost Research Establishment Wilmette Ill
R. W. Waterhouse, and H. F. Steeves. Nov 60, 18p Rept no. SIPRE-RR-71

Descriptors: (*Snow, Density), Theory, Mechanical engineering, Construction, Greenland, Loading (Mechanics).

The depth-density relationship of the surface snow to 30-ft depth at three locations on the Greenland Ice Cap east of Thule is presented. Rates of accumulation and densification deduced from the pit studies are used in elementary mathematical expressions developed in the report. These expressions describe a densification process applicable to continuously accumulating polar snow, between the depths of 10 and 40 ft. Loads, densities, and rates of densification are presented in relation to depth and time and applied to problems of undersnow military construction. (Author)
AD-653 134 HC$3.00 MF$0.65

CREEP OF ICE AT LOW STRESSES.
Research rept.,
Snow Ice and Permafrost Research Establishment Wilmette Ill
T. R. Butkovich, and J. K. Landauer. Aug 60, 15p Rept no. SIPRE-RR-72

Descriptors: (*Ice, Creep), Stresses, Glaciers, Shear stresses, Measurement, Strain (Mechanics).

Low stress creep measurements were made on commercial ice and small-grained glacier ice in the temperature range from -1.3 to -18.9C at stresses down to about 10,000 dynes/sq. cm. The uniaxial stresses and strain rates were reduced to shear stresses and shear strain rates by respectively dividing and multiplying the former by the square root of 3. The log shear strain rate vs log shear stress curves was essentially linear for the low-stress creep measurements. Assuming a linear flow law for low-stress creep, activation energies for creep of about 14,300 cal/mole were determined. It can also be seen t iat the smaller-grained ice has a higher viscosity coefficient. The observed activation energy for creep of ice is probably that for self-diffusion. Although lacking a concrete deformation mechanism, the rate process theory, which leads to a hyperbolic sine stress dependence, seems to best describe the experimental results. (Author)
AD-653 135 HC$3.00 MF$0.65

SURFACE TEMPERATURES AND GROWTH OF SEA ICE.
Research rept.,
Snow Ice and Permafrost Research Establishment Wilmette Ill
Michael A. Bilello. Jan 61, 16p Rept no. SIPRE-RR-75

Descriptors: (*Sea ice, Physical properties), Surface temperatures, Salinity, Thermal conductivity, Density, Heat of fusion, Numerical analysis.

Sea-ice surface temperatures observed at Eureka, N.W.T., Canada, during 1949-50 and 1950-51 were used to compute the numerical value of the expression k/L rho, where k = thermal conductivity, L = latent heat of fusion and rho = density. The numerical value for these combined physical properties of sea ice was found to increase from approximately 0.000047 to 0.00007 during ice growth (between 6 November and 22 December) from 0.6 to 1 m thickness. During the increase from 1.1 to 1.3 m (between 20 January and 10 Feb-

ruary) the value of k/L rho ranged from 0.00007 to 0.00008 and then decreased slightly during the rest of the growth period. These variations in the value of k/L rho throughout the winter season were considered as changes in the effective conductivity caused by physical changes and distribution of brine in the sea ice. Since no observations on sea-ice salinity were made at Eureka, it was not possible to investigate the effect of the physical properties separately. A study on the relation between sea-ice accretion and temperature gradient disclosed a correlation coefficient of r = 0.73. (Author)
AD-653 136 HC$3.00 MF$0.65

FORMATION, GROWTH, AND DECAY OF SEA ICE IN THE CANADIAN ARCTIC ARCHIPELAGO.
Research rept.,
Snow Ice and Permafrost Research Establishment Wilmette Ill
Michael A. Bilello. Jul 60, 43p Rept no. SIPRE-RR-65

Descriptors: (*Sea ice, Predictions), Arctic Ocean, Freezing, Atmospheric temperature, Snow, Thickness.

Freeze-up at Alert, Eureka, Isachsen, Mould Bay, and Resolute in the Canadian Arctic was observed to occur any time between the last week in August and the last week in September. A mathematical relationship between air temperature and sea-ice formation provided a favorable method for predicting the date of freeze-up at these stations. The maximum seasonal growth of sea ice, 269 cm, was measured at Isachsen; the minimum, 149 cm, was measured at Resolute. These values are based on measurements made at the five stations in the Canadian Arctic Archipelago having a total of 35 station years of record. Equations to predict the growth of sea ice by increments were derived empirically from the observations made at these locations. A separate term is introduced in the equations to take account of the effects of snow-cover depths on ice growth. To apply the formulas only air-temperature and snow-depth data are required. The study disclosed good correlation between air temperature and decrease in sea-ice thickness at the Arctic stations. The relationship was found to be: h = 0.55 sigma theta where h = decrease in ice thickness (cm) and sigma theta = accumulated degree days (above -1.8C). (Author)
AD-653 137 HC$3.00 MF$0.65

THERMODYNAMIC STUDIES OF A SNOW COVER IN NORTHERN MICHIGAN: ANALYSIS OF MICROMETEOROLOGICAL AND RELATED SNOW AND SOIL DATA FROM THE KEEWEENAW FIELD STATION.
Research rept.,
Michigan Univ Ann Arbor
Donald J. Portman, and Edward Ryznar. Jan 61, 84p
SIPRE-RR-74
Contract DA-11-190-ENG-30

Descriptors: (*Snow, Thermodynamics), (*Micrometeorology, Snow), Soils, Michigan, Heat transfer, Physical properties, Atmospheric temperature.

The heat transfer processes between a snow cover and its environment were studied and evaluated in order to predict changes in the physical characteristics of the snow cover from standard methorological information. The study was based on micrometeorological and related snow and soil data collected at the Keeweenaw Field Station (Mich.) from 1954-1956. Computations of conductive heat transfer in snow, using the Liljequist method, showed significant correlation with average air temperatures. Average values of the cold content of snow can be estimated from average air temperatures. Average temperature differences through the snow can be estimated from a knowledge of the previous 20-hr average air temperature; snow hardness can be estimated graphically from snow density and depth. (Author)
AD-653 138 HC$3.00 MF$0.65

SCOPE, PROBLEMS, AND POTENTIAL VALUE OF DEEP CORE DRILLING IN ICE SHEETS.
Special rept.,
Miami Univ Coral Gables Fla School of Engineering
Henri Bader. Dec 62, 15p
CRREL-SR-58
Contract DA-11-190-Eng-91

Descriptors: (*Ice, Drilling), (*Polar regions, Ice), Antarctic regions, Arctic regions, Geophysics, Glaciers, Water, Dust, Meteorites.
Identifiers: Core sampling.

This report is an attempt to show that the Project on Deep Core Drilling in Ice is of quite exceptionally high geophysical inte rest, and that it is worth all the support that can be mustered. (Author)
AD-653 141 HC$3.00 MF$0.65

ICE THICKNESS OBSERVATIONS IN THE NORTH AMERICAN ARCTIC AND SUBARCTIC FOR 1958-59, 1959-60.
Special rept.,
Cold Regions Research and Engineering Lab Hanover N H
Michael A. Bilello. Jul 61, 49p Rept no. CRREL-SR-43
See also AD-600 483 and AD-649 768.

Descriptors: (*Ice, Thickness), (*Arctic regions, Ice), (*North America, Reports), Canada, Meteorological phenomena, Measurement, Polar regions, Sea ice, Snow, Lakes, Data, Greenland, Alaska, Maps.

This is the first of a series of reports in which sea and lake ice thickness observations throughout the North American arctic and subarctic will be published. Results for the years 1958-59, 1959-60 are given in figures and in tables.
AD-653 143 HC$3.00 MF$0.65

EFFECTS OF A SHOCK WAVE ON A PETER SNOW ARCH.
Snow Ice and Permafrost Research Establishment Wilmette Ill
For primary bibliographic entry see Field 15G.
AD-653 147 HC$3.00 MF$0.65

HORIZONTAL VISUAL RANGE IN POLAR WHITEOUT.
Main Univ (West Germany) Meteorologisch-Geophysikalisches Institut
For primary bibliographic entry see Field 6P.
AD-653 149 HC$3.00 MF$0.65

AN UNDER-ICE CAMP IN THE ARCTIC.
Special rept.,
Cold Regions Research and Engineering Lab Hanover N H
Frank Russell. Jul 61, 17p Rept no. CRREL-SR-44

Descriptors: (*Polar regions, Environment), (*Underground structures, *Arctic regions), Greenland, Snow, Ice, Permafrost, Buildings, Construction, Terrain, Safety, Climatology, Scientific personnel, Mining engineering, Glaciers, Ventilation, Shelters, Civil engineering.

One of the objectives of polar research is to develop design criteria suitable to the calm environment inside the ice cap, where ambient air temperature remains constant all year at the +17F temperature of the ice. Inside the ice cap, wind load is not a factor, nor is loading of the structures by accumulated snow. Drifting snow under blizzard conditions can be ignored except for maintaining access to the portal. Safety and comfort of personnel within this environment is an important consideration, and protection from blast pressures and fallout in the event of a nuclear explosion cannot be overlooked.
AD-653 150 HC$3.00 MF$0.65

GROUND TEMPERATURE DATA OF BIOLOGICAL SIGNIFICANCE.
Arctic Aeromedical Lab Fort Wainwright Alaska
For primary bibliographic entry see Field 13M.
AD-653 180 HC$3.00 MF$0.65

GLACIATION OF THE URALS, NO. 16.
Academy of Sciences (USSR), Moscow. Soviet Geophysical Committee.
A. S. Guskov, V. G. Khodakov, I. M. Lebedeva, V. I. Mikhaliov, and L. S. Troitsky. 1966, 345p in Russian, English Summary

Descriptors: *Glaciology, *Hydrometeorology, *Ice formation, *Thermodynamic property, *U.S.S.R., Accumulation, Balance, Bibliography, Characteristics, Cover, Equation, Evaporation, Formation, Glacier, Heat, History, Ice, Mass, Measurement, Mountain, Process, Property, Snow, Structure, Temperature, Thermodynamic.

For abstract, see STAR 05 14.
N67-27141 HC$3.00 MF$0.65

8M. SOIL MECHANICS

MOBILITY ENVIRONMENTAL RESEARCH STUDY ONE-PASS PROGRAM.
Army Tank-Automotive Center, Warren, Mich. Land Locomotion Lab.
For primary bibliographic entry see Field 13F.
AD-467 165 HC$3.00 MF$0.65

STRESS AND WAVE PATTERNS IN SOILS SUBJECTED TO DYNAMIC LOADS.
Research rept.,
Cold Regions Research and Engineering Lab Hanover N H
R. K. Bernhard. Mar 67, 60p Rept no. CRREL-RR-120

Descriptors: (*Soils, Loading (Mechanics)), Stresses, Mechanical waves, Dynamics, Shear stresses, Vibration, Propagation, Impact shock, Mechanical properties, Soil mechanics.

The report is divided into four parts: Parts I and II cover investigations of the reliability of shear stress measurements in soils subjected to vibratory loads for biaxial and triaxial systems, respectively. Part I is a summary only (See SIP 21834 for detailed treatment). Part III is a study of three-dimensional 'principal' stress patterns produced in soil subjected to vibratory loads. Part IV is a theoretical analysis of some aspects of soil wave propagation in stratified soil. From the measurements of five shear stresses and one normal stress, the stress distribution of a triaxial system can be determined. In noncohesive soils triaxial stress fields due to vibratory loads can be determined by recording six independent stress components. Sinusoidal force excitation and impact excitation yield time -distance graphs which can be used to determine reflection and refraction techniques in stratified soils. (Author)
AD-652 871 HC$3.00 MF$0.65

RESONANCE CURVE ANALYSIS.
Cold Regions Research and Engineering Lab Hanover N H
For primary bibliographic entry see Field 20K.
AD-653 144 HC$3.00 MF$0.65

REPLACEMENT OF WATER BY AIR IN SOIL PORES.

Research paper.
National Research Council of Canada Ottawa (Ontario) Div of Building Research
P. J. Williams. Apr 67, 12p Rept no. RP-311 NRC-9533
Availability: Published in The Engineer v223 n5796 p293-8 Feb 24 1967.

Descriptors: (*Air, Soils), Water, Minerals, Soil mechanics, Refractive index, Drainage, Equations, Bubbles, Physical properties, Time, Microscopes, Particle size, Membranes, Pressure, Sampling, Tests.

Soils composed of minerals having the same refractive index as water are translucent when saturated. Any air in the pores is fully visible. Such soils have been used to observe the manner in which air may replace water in soil pores. Where the external air and water pressures are established such as to cause rapid drainage of water, the air suddenly spreads through the pore structure at a certain air/water pressure difference. Where drainage occurs more slowly, a progressive diffusion of air in solution occurs, giving enlargement of bubbles, as well as a progressive breakdown of menisci not easily explainable from capillary theory.
AD-653 385 Not available from CFSTI.

MEASUREMENT OF NEGATIVE PORE PRESSURE OF UNSATURATED SOIL. SHEAR AND PORE PRESSURE RESEARCH, EARTH RESEARCH PROGRAM,
Bureau of Reclamation, Denver, Colo. Soils Engineering Branch.
P. C. Knodel, and C. T. Coffey. 11 Oct 66, 95p Rept. no. EM-738

Descriptors: (*Soil mechanics, Porosity), Air, Moisture, Pressure, Stresses, Compressive properties, Test methods, Internal friction, Adhesion.

Studies of soil strength on an effective stress basis require reliable data on pore air pressure and pore water pressure. Pore air pressure has been computed using the laws of Boyle and Henry; the new measuring techniques confirm the validity of applying these laws to partially saturated soils. While suction pressures may have several components--capillary, osmotic, and adsorption pressures--these are considered as equivalent capillary pressures in this study. Suction pressures have been determined by the exposed end-plate test procedure to values well beyond the normal range of 0 to -1 atm. Incorporation of the exposed end-plate test principles into a sealed compression test pertest principles into a sealed compression test permits a separate evaluation of suction pressure. These pore pressure measurements and evaluation techniques were applied to 4 triaxial shear test series using 2 soils with 2 initial densities and water contents each. The first 2 series illustrated testing technique problems. The second 2 permitted pore pressure measurements suitable for evaluating effec tive stresses, considering capillary effects which considerably altered the shear strength parameters, internal friction angle, and cohesion. (Author)
PB-173 763 HC$3.00 MF$0.65

STUDY OF LONG-TERM DEFORMATION OF COMPACTED COHESIVE SOIL EMBANKMENTS.
Final rept.,
Ohio State Univ., Columbus. Transportation Engineering Center.
W. H. Perloff, Jr. 18 Jan 66, 65p EES-260-1
Prepared in cooperation with Purdue Univ. and Bureau of Public Roads, Washington, D. C.

Descriptors: (*Soil mechanics, Deformation), (*Foundations (Structures), Soil mechanics), Soils, Creep, Stresses, Koolinite, Experimental data.

Two artificial soils, grundite and Edgar Plastic Kaolin were tested. Their behavior was indistinguishable qualitatively irrespective of compaction method or energy level. Strain differences E sub 1 - E sub 3 determined in the tests have been expressed mathematically as E sub 1 - E sub 3 = at to the b power. The relationships of a and b with respect to cyclic loading, confining pressure and water content was studied. A discussion of stress distribution theories is presented. (Author)
PB-173 924 HC$3.00 MF$0.65

STABILIZATION OF SILTY SOILS IN ALASKA-PHASE II,
Alaska Univ., College. Arctic Environmental Engineering Lab.
For primary bibliographic entry see Field 13B.
PB-174 727 HC$3.00 MF$0.65

8N. TERRESTRIAL MAGNETISM

GEOTHERMAL AND MAGNETIC SURVEY OFF THE COAST OF SUMATRA. 1. PRESENTATION OF DATA,
Scripps Institution of Oceanography La Jolla Calif
V. Vacquier. 31 Mar 66, 10p
Contract Nonr-2216 (05), Grant NSF-G 22255
Prepared in cooperation with Stanford Univ., Calif. Dept. of Geophysics.
Availability: Published in Bulletin of the Earthquake Research Institute v44 p531-40 1966.

Descriptors: (*Terrestrial magnetism, *Thermal properties), Heat, Terrain, Anomalies, Thermal properties, Oceanology, Data, Indonesia.

Total magnetic intensity and terrestrial heat flow were observed along profiles off the coast of Sumatra. The topographic swell just seaward of the trench was found to have a heat flow greater than 1.5 mu cal/sq cm/sec, as compared with a value of less than 1 mu cal/sq cm/sec both in the deep trench and seaward of the swell. It is suggested that there might be a band of high heat flow in front of all deep-sea trenches. The magnetic anomalies trend mostly east-west and do not follow the curve of the Indonesian island arc. (Author)
AD-652 762 Not available from CFSTI.

PALEOMAGNETIC STRATIGRAPHY, RATES OF DEPOSITION AND TEPHRACHDRONOLOGY IN NORTH PACIFIC DEEP-SEA SEDIMENTS,
Lamont Geological Observatory Palisades N Y
For primary bibliographic entry see Field 8G.
AD-652 765 Not available from CFSTI.

THE 5E-5 RUBIDIUM-85 VAPOR MAGNETOMETER.
Technical memo.,
Johns Hopkins Univ Silver Spring Md Applied Physics Lab
W. E. Radford. Feb 67, 43p Rept no. TG-890
Contract NOw-62-0604

Descriptors: (*Rubidium, *Magnetometers), (*Vapors, Magnetometers), Satellites (Artificial), Mapping, Telemetering data, Networks, Magnetic fields, Ionosphere, Van Allen radiation belt, Storms, Flight testing, Design, Booms, Calibration, Doppler systems, Tracking, Attitude control systems, Measurement.

Satellite 1964 83C was launched on December 13, 1964, into a nearly circular polar orbit, with inclination 89.993 degrees, period 106.3 minutes, perigee 1019 km, and apogee 1094 km. The satellite contains a Rubidium-85 vapor magnetometer, which successfully mapped, at middle and low latitudes, the geomagnetic field in the region traversed while the satellite was within telemetry range of a network of ground stations. These data are being analyzed in studies relating to the analytic description of the geomagnetic field and to the magnetic effects of quiet-time currents in the lower ionosphere and of magnetic storm-time currents in the Van Allen zones of trapped radiation. The present report discusses the elements relevant to the magnetometer assembly, pre-flight tests, in-flight calibrations, and some of the geomagnetic data obtained. (Author)
AD-652 807 HC$3.00 MF$0.65

PEARL TYPE TELLURIC CURRENT MICROPULSATIONS AT COLLEGE.
Revised ed.,
Alaska Univ College Geophysical Inst
R. R. Heacock, and V. P. Hessler. 27 Jun 62, 15p Rept no. Scientific-1
AFCRL-67-0244
Contract AF 19 (628)-1695
Revision of manuscript submitted 4 Jun 62.
Availability: Published in Journal of Geophysical Research v67 n10 p3985-95 Sep 1962.

Descriptors: (*Terrestrial magnetism, *Electromagnetic pulses), (*Telluric currents, Electromagnetic pulses), Electronic equipment, Measurement, Periodic variations, Protons, Atmospheric electricity, Electromagnetic fields.
Identifiers: Pearls.

Rapid-run recordings were made of telluric currents at College from October 14, 1961 to April 1, 1962. Pearl-type short-period (1-5 sec) micropulsation data from those records are presented and analyzed, and the instrumentation is described. It is shown that a pearl event at College is composed of pearl 'necklaces', a necklace being a sequence of pearls with a nearly constant spacing of several minutes and with a nearly constant pulse frequency. When several necklaces are superimposed, the pulse frequencies are, in general, different, and the different frequencies interact to form adjacent 'beads'. (Author)
AD-652 858 Not available from CFSTI.

THE EFFECT OF TOPOGRAPHY AND GEOLOGY ON TELLURIC CURRENTS.
Revised ed.,
Alaska Univ College Geophysical Inst
Eugene M. Wescott, and V. P. Hessler. 18 Aug 62, 15p Rept no. Scientific-2
AFCRL-67-0245
Contract AF 19 (628)-1695
Revision of manuscript submitted 23 Jul 62.
Availability: Published in Journal of Geophysical Research v67 n12 p4813-23 Nov 1962.

Descriptors: (*Telluric currents, Electromagnetic pulses), (*Terrestrial magnetism, *Electromagnetic pulses), Alaska, Aurorae, Ionospheric disturbances, Voltage, Geological survey, Terrain, Geology, Models (Simulations), Electric fields.

The electric field vectors associated with telluric currents are known to vary in relative magnitude and principal direction at different locations. A number of temporary recording sites were occupied in the College, Alaska, region, where telluric currents have been recorded routinely since 1955. The results of this study show that the relative magnitude may change by a factor of 5 and that the principal direction may range over 33 degrees and in one extreme case 70 degrees, in the area of radius 10 miles from the Geophysical Institute. Model studies using a two-dimensional resistor network were made to determine the effects of some simple topographic and conductivity configurations on the telluric field. (Author)
AD-652 859 Not available from CFSTI.

TELLURIC CURRENT MICROPULSATION BURSTS,
Alaska Univ College Geophysical Inst
R. R. Heacock, and V. P. Hessler. 1 Nov 62, 6p Rept no. Scientific-3
AFCRL-67-0246

Contract AF 19 (628)-1695
Availability: Published in Journal of Geophysical Research v68 n3 p953-4 Feb 1 1963.

Descriptors: (*Terrestrial magnetism, *Electromagnetic pulses), (*Telluric currents, Electromagnetic pulses), (*Nuclear explosions, Telluric currents), Pacific Ocean, Periodic variations, Johnston Island, Magnetic storms, Electromagnetic fields, Magnetometers.

The telluric current micropulsation burst at College generated by the 9 July 1962 thermonuclear blast in the South Pacific is shown to be similar in spectral structure to natural bursts observed at College. The bursts display high frequency activity with periods of 2-3 seconds during the first minute followed by lower frequency activity for perhaps an hour following the sudden commencement. (Author)
AD-652 860 Not available from CFSTI.

AURORAL-ZONE TELLURIC-CURRENT MICROPULSATIONS T LESS THAN 20 SECONDS.
Revised ed.,
Alaska Univ College Geophysical Inst
R . R. Heacock. 31 Dec 62, 18p Rept no. Scientific-4
AFCRL-67-0247
Contract AF 19 (628)-1695
Revision of manuscript submitted 29 Oct 62.
Availability: Published in Journal of Geophysical Research v68 n7 p1871-84 Apr 1 1963.

Descriptors: (*Terrestrial magnetism, *Electromagnetic pulses), (*Telluric currents, Electromagnetic pulses), Aurorae, Alaska, Diurnal variations, Ionospheric disturbances, Cosmic ray bursts, Canada, Electronic equipment, Measurement, Electrons, Van Allen radiation belt, Magnetosphere, Solar disturbances.
Identifiers: Pearls.

Telluric-current micropulsations were recorded at Barrow, College, Fort Yukon, Meanook, and Palmer. The diurnal variation data suggest a spiral pattern of occurrence in the auroral zone for the aurorally associated micropulsations (T = 3/20 sec). A spiral pattern of pearl-type micropulsation occurrence may exist at lower latitudes. Many pearl events having sudden onsets and very large amplitudes were found to be well correlated with simultaneous cosmic noise absorption. Simultaneous pearl 'necklaces' were recorded. The occurrence of pearls at College seems to be negatively correlated with the occurrence of aurora. Evidence was found on increase ionization in the F layer at times of extremely large-amplitude pearls. (Author)
AD-652 861 Not available from CFSTI.

PERIODIC COVARIATION OF RADIOWAVE ABSORPTION, EARTH CURRENTS AND OTHER ASSOCIATED PHENOMENA IN THE AURORAL ZONE.
Revised ed.,
Alaska Univ College Geophysical Inst
R. Parthasarathy, and V. P. Hessler. 17 Mar 64, 9p Rept no. Scientific-5
AFCRL-67-0248
Contracts AF 19 (628)-1695, NAS5-3595
Revision of manuscript submitted 31 Jan 64.
Availability: Published in Journal of Geophysical Research v69 n13 p2867-71 Jul 1 1964.

Descriptors: (*Terrestrial magnetism, *Electromagnetic pulses), (*Telluric currents, Electromagnetic pulses), Alaska, Periodic variations, Aurorae, Cosmic ray bursts, Ionospheric disturbances, Magnetosphere, Electrons, Absorption, Measurement.
Identifiers: Vaisala oscillations.

Investigation of the absorption of cosmic noise near the auroral zone by means of the Riometer technique shows frequent examples of periodic phenomena with periods less than 10 minutes, but most commonly with periods of about 5 minutes. Confinement to a narrow belt of latitude seems to be a characteristic of this activity. One event with prominent activity at College and Healy did not appear on the Anchorage nor Ft. Yukon records. There is a close correlation between these events and similar periodic activity on the tellurograms, magnetograms and intensity of 5577 A emission from the zenith. It is suggested that this periodic phenomena may be generated by the gravity controlled periodic vertical motions of air masses, known as Vaisala oscillations. (Author)
AD-652 862 Not available from CFSTI.

PEARL-TYPE MICROPULSATIONS ASSOCIATED WITH MAGNETIC STORM SUDDEN COMMENCEMENTS.
Revised ed.,
Alaska Univ College Geophysical Inst
R. R. Heacock, and V. P. Hessler. 16 Nov 64, 13p Rept no. Scientific-6
AFCRL-67-0249
Contract AF 19 (628)-1695
Revision of manuscript submitted 21 Oct 64.
Availability: Published in Journal of Geophysical Research v70 n5 p1103-11 Mar 1 1965.

Descriptors: (*Terrestrial magnetism, *Electromagnetic pulses), (*Telluric currents, Electromagnetic pulses), (*Magnetic storms, Telluric currents), Statistical analysis, Periodic variations, Measurement, Cosmic ray bursts, Aurorae.
Identifiers: Pearls.

Two years of continuous telluric current micropulsation records from College were scanned for evidence of a significant relationship between magnetic storm sudden commencements and pearl-type events that follow closely after the ssc's. Thirteen of 24 ssc's were followed by pearl events. Ten of these events occurred between 1200 and 2000 LMT, during which time there were 11 ssc's. Eight structured pearl events were found. The most prominent pearl events followed the ssc's that were preceded by very quiet magnetic field conditions. (Author)
AD-652 863 Not available from CFSTI.

INTRA- AND INTERHEMISPHERE DIFFERENCES IN OCCURRENCE TIMES OF HYDROMAGNETIC EMISSIONS.
Revised ed.,
Alaska Univ College Geophysical Inst
R. C. Wentworth, Lee Tepley, K. D. Amundsen, and R. R. Heacock. 6 Dec 65, 11p Rept no. Scientific-7
AFCRL-67-0250
Contracts AF 19 (628)-1965, NAS5-3701
Revision of manuscript submitted 1 Oct 65.
Availability: Published in Journal of Geophysical Research v71 n5 p1492-8 Mar 1 1966.

Descriptors: (*Terrestrial magnetism, *Telluric currents), (*Ionospheric propagation, *Electromagnetic waves), Alaska, Hawaii, California, Aurorae, Accuracy, Errors, Electromagnetism, Wave transmission, Ionospheric disturbances, Propagation.
Identifiers: Pearls, Hydromagnetic waves.

Identifiable fine structure elements of hydromagnetic emissions (Pc 1) are observed to appear earlier at high latitudes. With an accuracy of plus or minus 0.8 sec the average time delay between College, Alaska, and Kauai, Hawaii, was found to be 5.8 sec, and between Palo Alto, California, and Kauai, 3.2 sec. It is suggested that these hm emissions propagated toward the equator from the auroral zone as a hydromagnetic wave in a waveguide centered at the F2 peak. The filtering and re-recording techniques used to obtain the 'cultured pearls' from w iich the time delay was measured are described in detail. Possible sources of error in determining the time of arrival of a pearl, including station timing, the affect of recording only one component, bandwidth of the filters, etc., are discussed. (Author)
AD-652 864 Not available from CFSTI.

EVENING MICROPULSATION EVENTS WITH A RISING MIDFREQUENCY CHARACTERISTIC,
Alaska Univ College Geophysical Inst
R. R. Heacock. 8 Aug 65, 14p Rept no. Scientific-8
AFCRL-67-0251
Contracts AF 19 (628)-1695, Nonr-3010 (01)
Availability: Published in Journal of Geophysical Research v72 n1 p399-408 Jan 1 1966.

Descriptors: (*Terrestrial magnetism, *Electromagnetic pulses), (*Telluric currents, Electromagnetic pulses), Diurnal variations, Electrons, Protons, Aurorae, Alaska, Wave transmission, Ionospheric disturbances, Nuclear explosions, Magnetosphere, Exosphere.
Identifiers: Pearls.

Many examples of evening micropulsation events with rising midfrequencies were found on the several years of continuous College micropulsation records. The midfrequency typically rises from 0.1 to 0.5 cps over a similar 1-hour event duration. There is a pronounced diurnal variation in occurrence, with maximum near 2000 local time, and there is a seasonal variation with most occurrences in summer. Three of the possible source mechanisms are briefly discussed: (1) systematic variations in the characteristics of the lower exosphere resonance cavity, (2) excitation via a growing wave mechanism with the additional assumption of a time-decreasing midenergy in the electron or proton beam, and (3) excitation via proton cyclotron instabilities near the equatorial plane with inward diffusion of the protons. (Author)
AD-652 865 Not available from CFSTI.

9. ELECTRONICS AND ELECTRICAL ENGINEERING

9A. COMPONENTS

LARGE-AREA ELECTRONIC DISPLAY PANEL.
Quarterly progress rept. no. 9, 1 Jun-31 Aug 64,
General Electric Co., Syracuse, N. Y.
J. W. Brouillette, R. B. Gethmnnn, and M. L. Noble. 31 Aug 64, 53p
Contract DA-36-039-sc-90755

Descriptors: (*Display systems, Electronic equipment), Electron guns, Thermoplastics, Films, Optical equipment, Lenses, Diffraction, Elec tromagnetic lenses, Tests, Voltage, Currents, Photographic recording systems, Electron optics, Deformation, Resolution, Electron beams.

The work is directed to advancing the state-of-the-art of large-area electronic display. Prime interest is placed on achievement of high-resolution images that may be comfortably viewed under conditions of high ambient illumination. The selected approach consists of an electron beam writing on a thermoplastic film with a novel optical projection system. Development work is generally divided into two categories, electron beam writing and optical projection. The list of specific tasks for the project is somewhat modified over that given at the outset of the project. This modification is brought about by the completion of certain tasks, and in some cases, new information obsoletes previously planned tasks. (Author)
AD-451 545 HC$3.00

PRODUCTION ENGINEERING MEASURE FOR TYPE CR- (XM-57)/U CRYSTAL UNITS.
Quarterly rept. no. 1, Apr-Jun 66,

Bulova Watch Co., Inc., Woodside, N. Y. Electronics Div.
K. Dance. Jun 66. 23p
Contract DA-36-039-AMC-06182 (E)

Descriptors: (*Quartz resonators, Manufacturing methods), Design, Precision finishing, Annealing, Production control, Crystals, High frequency.

During the period the following work was performed: (1) Ordering of materials, (2) preliminary analysis of crystal designs and mounting structures, the improvement of edge finishing on the resonators, and the establishing of annealing procedures for the plated blank, (3) preparation of a PERT control system to cover the flow of the contract.
AD-642 809 HC$3.00 MF$0.65

PRODUCTION ENGINEERING MEASURE FOR CAPACITORS, ELECTROLYTIC, ALUMINUM HIGH RELIABILITY.
Quarterly rept. no. 1, 20 Jun-20 Sep 66,
Federal Pacific Electric Co., Sanford, N. C. Cornell-Dubilier Electronics Div.
J. E. Hand. 14 Nov 66. 14p
Contract DA-36-039-AMC-06189 (E)

Descriptors: (*Electrolytic capacitors, Manufacturing methods), (*Aluminum, Capacitors), Reliability (Electronics), Dielectric films, Oxides, Impregnation, Paper, Seals.

Several tests were completed on dielectric oxide film formation. Capacitors were assembled for impregnating electrolyte and paper system evaluations. Seal evaluation tests were started.
AD-642 810 HC$3.00 MF$0.65

A SYNTHESIS METHOD FOR CROSSED-FIELD ELECTRON GUNS.
Interim rept. no. 14,
California Univ Berkeley Electronics Research Lab
R. A. Rao. Mar 67. 180p Rept no. ERL-67-3 ECOM-02164-14
Contract DA-36-039-AMC-02164 (E)

Descriptors: (*Electron guns, Crossed field devices), Synthesis, Electrodes, Space charges, Equations of motion, Electrons, Electron beams, Mathematical analysis.

A general approximate method for the synthesis of crossed-field sheet beams and for the determination of electrodes to produce such beams is developed. The limitations of the method and its accuracy are discussed with reference to some problems of practical importance in microwave amplifiers. The problem of synthesizing an electron beam requires compromises among various competing factors; hence it is desirable to work with approximate methods in which the effects of the various requirements may be studied and modifications may be made on these requirements. The first-order paraxial-ray equation is such an equation in which the important beam parameters are included in a simple mathematical description of the central trajectory of the beam. The approximation comes about in specifying the beam parameters on the nonaxial trajectories in terms of power-series expansions of their values on the axis and neglecting higher-order terms in beam thickness. This approximation is shown to be sufficiently accurate for thin beams. The numerical solutions for the beam parameters obtained from the paraxial-ray equation may be put in analytic form by using polynomical approximations, and analytic methods may be used for the determination of the electrodes to produce such beams. (Author)
AD-652 701 HC$3.00 MF$0.65

WIDE-ANGLE INTERNAL DEFLECTION STRUCTURES OF CATHODE-RAY TUBES.
Triannual rept. no. 1, 1 Jul-31 Oct 66,
Polytechnic Inst of Brooklyn Farmingdale N Y Dept of Electrophysics
Rudolf G. E. Hutter. Apr 67. 15p Rept no. PIB-MRI-1355.1-66 ECOM-02449-1
Contract DA-28-043-AMC-02449 (E)

Descriptors: (*Electron lenses, Deflection), (*Electron guns, Cathode ray tubes), Focusing, Cylindrical bodies, Corrections, Design.

Theoretical studies were made to derive suitable forms of the focal length of a deflection system and with the effect of isolation electrodes between the horizontal and vertical deflection systems. Discussion led to the design of an electron gun, suitable for studies of dynamic correction of deflection defocussing by means of electrodes in the main lens which have elliptical apertures. This gun will be ready for tests early in December 1966. Studies continue to determine theoretically the functional relation between deflection voltage and dynamic correction voltage. (Author)
AD-652 718 HC$3.00 MF$0.65

COMPOSITE THERMOPLASTIC/GLASS FILAMENT REINFORCEMENT FOR BUOYANT SUBMARINE CABLES RG-372 (XN-1)/U AND RG-373 (XN-1)/U.
Union Carbide Corp Bound Brook N J Research and Development Dept
For primary bibliographic entry see Field 11D.
AD-652 810 HC$3.00 MF$0.65

DIGITAL RECORDING AND PLAYBACK EQUIPMENT (DRAPE).
Johns Hopkins Univ Silver Spring Md Applied Physics Lab
For primary bibliographic entry see Field 14C.
AD-652 817 HC$3.00 MF$0.65

EXPERIMENTAL OBSERVATION OF NON-LINEAR COUPLING BETWEEN SLOW AND FAST WAVES IN A PLASMA WAVEGUIDE,
Royal Inst of Tech Stockholm (Sweden) Microwave Dept
P. Hedvall. 23 Feb 67. 15p Rept no. Scientific-17
RADC-TR-67-323
Contract AF 61 (052)-895
See also AD-645 747.

Descriptors: (*Waveguides, Plasma medium), Sweden, Nonlinear systems, Pumping (Electronics), Propagation, Coupling circuits, Cavity resonators, Excitation.

Non-linear coupling between slow and fast waver in a circular waveguide partially filled with a plasma was studied experimentally. The waveguide was short-circuited to form a resonant cavity. A slow, symmetrical wave was launched on the plasma column and propagated into the cavity. By feeding pump power into the TM sub 010 resonant mode of the cavity a non-linear coupling between the slow wave and the TM sub 011 resonant mode could be achieved when the frequency of the slow wave was equal to the frequency difference between the two resonant modes. With a pump power of 1 watt an over-all coupling coefficient of the order of - 40 dB was obtained. (Author)
AD-652 835 HC$3.00 MF$0.65

A PASSIVE METHOD OF IMPROVING COMMON-MODE REJECTION,
Harry Diamond Labs Washington D C
Karl H. Krey. Apr 67. 37p Rept no. HDL-TR-1347

Descriptors: (*Electromagnetic pulses, *Transformers), (*Data processing systems, *Input-output devices), Magnetic cores, Broadband, Impedance, Voltage, Interference, Attenuation, Distortion, Signals, High frequency, Coils, Reliability (Electronics), Functions.

Theory and experimental results are given which show that considerable common-mode rejection can be achieved with a passive magnetic device. Equations are developed which give the characteristics of differential and common-mode input impedances. Rejection ratios as high as 80 dB were obtained experimentally. For frequencies extenuing from 10 Hz to 10 MHz, the common-mode rejection was in excess of 53 dB. Simultaneously, differential-mode signals of approximately the same frequency range were passed without distortion and with less than 1/2-dB attenuation. Rectangular pulses of 20-nsec rise time were also passed in the differential mode without noticeable distortion. The given results can be improved substantially in specific applications.
AD-652 877 HC$3.00 MF$0.65

THIN-FILM POLYCRYSTALLINE FIELD-EFFECT TRIODE.
Quarterly rept. no. 3, 1 Jan-31 Mar 66,
Radio Corp of America Somerville N J Defense Microelectronics
M. L. Topfer, A. H. Danis, and A. K. Rapp. May 67. 17p
ECOM-02432-3
Contract DA-28-043-AMC-02432 (E)

Descriptors: (*Films, *Field effect transistors), Circuits, Performance (Engineering), Frequency, Triodes, Data, Time, Analysis, Tests.

The report contains work on the complementary three-input NAND gate circuit. Twelve additional circuits were delivered to Fort Monmouth for evaluation. A new set of masks was designed for this circuit which will lead to improved performance and frequency response. Life test data that have been accumulated for almost three thousand hours are presented. Test data on the delivered circuit are also presented. (Author)
AD-652 885 HC$3.00 MF$0.65

EXTENDED LIFE TEST OF SOLID ELECTROLYTE TANTALUM CAPACITORS.
Technical rept.,
Army Electronics Command Fort Monmouth NJ
Herschel L. Stout. Mar 67. 15p Rept no. ECOM-2812

Descriptors: (*Tantalum capacitors, Life expectancy), Capacitance, Leakage (Electrical), Failure (Electronics), Performance (Engineering), Dissipation factor.

Capacitance, dissipation factor and dc leakage of solid electrolyte tantalum capacitors were measured at intervals throughout a 26,000-hour life test. Seventy-five percent of ten capacitors survived with no degradation in properties and no indication of impending wearout. All failures were associated with a measurement period, leading to the inference that discharging and recharging operations may be a failure hazard. (Author)
AD-652 891 HC$3.00 MF$0.65

ELECTROMAGNETIC MOMENTUM ASSOCIATED WITH WAVEGUIDE MODES,
Massachusetts Inst of Tech Cambridge Research Lab of Electronics
Paul Penfield. 7 Jun 66. 1p
Contract DA-36-039-AMC-03200 (E)
Availability: Published in Proc. IEE. v113 n9 p1504 Sep 1966.

Descriptors: (*Waveguides, Electromagnetic properties), Identities, Momentum, Equations, Propagation.

Correspondence is presented concerning the electromagnetic momentum associated with wave-

guide modes. A method for analysing problems in waveguides is discussed.
AD-652 907 Not available from CFSTI.

THE PHASE SYNCHRONIZATION OF A PARAMETRIC SUBHARMONIC OSCILLATOR.
Michigan Univ Ann Arbor Dept of Electrical Engineering
For primary bibliographic entry see Field 20C.
AD-653 032 HC$3.00 MF$0.65

QUARTERLY STATUS REPORT NO. 105, 1 JANUARY THROUGH 31 MARCH 1967.
Stanford Univ Calif Stanford Electronics Labs
For primary bibliographic entry see Field 20I.
AD-653 095 HO$3.00 MF$0.65

NECESSARY CONDITIONS FOR TRANSFORMERLESS REALIZATION OF ONE-TERMINAL PAIR RLC WITH ONE RESISTOR,
Illinois Univ Urbana Coordinated Science Lab
For primary bibliographic entry see Field 9E.
AD-653 157 HC$3.00 MF$0.65

INVESTIGATION AND DEVELOPMENT OF SEMICONDUCTOR-METAL CATHODES,
Lawrence S. Lerner, Thomas O. Yep, and Robert J. Archer. Apr 67, 60p Rept no. Scientific-2
AFCRL-67-0296
Contract AF 19 (628)-5946
See also AD-641 614.

Descriptors: (*Semiconductor devices, *Cathodes), (*Thermionic emission, Cathodes), Interfaces, Electric connectors, Gallium arsenides, Phosphides, Gallium compounds, Zinc sulfides, Zinc compounds, Oxides, Selenides, Boron compounds, Gold, Work functions, Etched crystals, Photoelectric effect.
Identifiers: Boron phosphides, Gallium arsenophosphide, Gallium phosphide, Zinc oxide, Zinc selenide, Schottky barriers.

Schottky barrier heights for metal-GaAs1-xPx rectifying contacts with vacuum cleaved, atomically clean interfaces decrease slightly and monotonically with metal work function, and show no significant dependence on the chemical nature of the metal. Specifically, the expectation that acceptor metals (Zn, Cd, Mn and Cu) might lead to large barriers was not realized. Au contacts on etch-polished surfaces of GaP and ZnSe are 1.45 eV and 1.47 eV, respectively. The preparation of these 'practical' contacts was aided by an ellipsometric study of surface cleanliness as a function of variations in chemical processing. Cleaner interfaces always lead to more nearly ideal contact properties. The electrical characteristics of all of the barriers (with the probable exception of those on B6P) are sufficiently ideal to indicate that a large fraction of the total forward current is hot electrons injected into the metal. This fact combined with the fact that the barrier heights are in most cases equal to or greater than the value expected for the lowered metal work function establishes the practicality of the semiconductor-metal cathode. (Author)
AD-653 190 HC$3.00 MF$0.65

CONSTANT RESISTANCE ONE-PORTS WHICH INCLUDE NONLINEAR TIME-VARYING ELEMENTS,
California Univ Berkeley Dept of Electrical Engineering
C. A. Desoer, and K. K. Wong. 7 Apr 66, 9p
AROD-5177:5
Grants DA-ARO (D)-31-124-G576, NSF-GK-569
Availability: Published in IEEE Transactions on Circuit Theory vCT-13 n4 p403-9 Dec 1966.

Descriptors: (*Resistance (Electrical), *Electrical networks), Differential equations, Theorems, Electric currents, Voltage, Control systems, Nonlinear systems, Circuits, Resistors, Signals, Time, Electrical engineering.

Methods for generating constant resistance one-ports with nonlinear and time-varying elements are proposed. The first step is a general characterization of constant resistance one-ports with linear time-invariant elements. This characterization is then used to generate classes of one-ports whose elements may be nonlinear and time-varying. Examples are given of constant resistance one-ports that include one-ports which neither need to be current-controlled. In one case, the necessary and sufficient conditions for constant resistance are given.
AD-653 222 Not available from CFSTI.

EQUIVALENT CIRCUITS FOR SLOTS IN RECTANGULAR WAVEGUIDE,
Polytechnic Inst of Brooklyn N Y Microwave Research Inst
Arthur A. Oliner. Aug 51, 27p Rept no. PIBMRI-234-50
PIBAL-179
Contract AF 19 (122)-3

Descriptors: (*Waveguide slots, Analysis), Waveguides, Circuits, Design, Rectangular bodies, Equations, Microwaves, Measurement, Transmission lines.

Contents: Equivalent circuit representations and measurement procedures; Variational calculations of the equivalent circuit parameters for thin slots; Comparison of theoretical and experimental results; The study of a half space in terms of spherical transmission lines.
AD-653 302 HC$3.00 MF$0.65

ON COUPLED VAN DER POL OSCILLATORS.
Texas Univ Austin Dept of Electrical Engineering
For primary bibliographic entry see Field 9E.
AD-653 305 Not available from CFSTI.

ORTHOGONAL WAVES ON ELECTRON BEAMS.
Revised ed.,
Army Electronics Labs Fort Monmouth N J
Bruno W. Zotter. 15 Jul 66, 5p
Revision of manuscript submitted 6 May 66.
Availability: Published in IEE Transactions on Electron Devices vED13 n12 p925-9 Dec 1966.

Descriptors: (*Electron beams, Magnetic fields), (*Wave functions, Electron beams), Transformations (Mathematics), Bessel functions, Matrix algebra, Space charges, Electron tubes.

The propagation of slow electrokinetic waves on finite electron beams which fill a conducting tunnel is discussed for modes of axial symmetry. In addition to the familiar space-charge modes, a pair of modes exists which are related to the vortex frequency omega sub nu = omega sub c - 2 (the partial derivative of omega sub zero with respect to time). The finite magnetic field introduces a coupling between these modes. A set of four orthogonal modes can be derived by the use of matrix transformations, thus eliminating the necessity of solving a complicated characteristic equation. For infinitely high magnetic fields, the two additional modes disappear and the four modes reduce to the fast and slow space-charge waves. (Author)
AD-653 341 Not available from CFSTI.

A TWO-PORT MAGNETOELASTIC DELAY LINE IN THE UHF REGION.
Army Electronics Labs Fort Monmouth N J
For primary bibliographic entry see Field 20L.
AD-653 342 Not available from CFSTI.

ON THE THEORY OF RANDOMLY MISALIGNED BEAM WAVEGUIDES.
Revised ed.,
American Museum of Natural History New York Dept of Animal Behavior
Felix K. Schwering. 28 Nov 66, 11p
Revision of manuscript submitted 29 Aug 66.
Availability: Published in IEEE Transactions on Microwave Theory and Techniques vMTT-15 n4 p208-15 Apr 1967.

Descriptors: (*Waveguides, Iterations), (*Lenses, Attenuation), Integral equations, Functions, Perturbation theory, Approximation (Mathematics), Green's function, Transmission lines, Misalignment, Magnetic fields.

A straightforward method for the determination of the expected attenuation in misaligned beam waveguides is presented. It applies to confocal guides and assumes that the misalignment consists of random displacements of the lenses in directions perpendicular to the beam axis. Reiterative fields, as they are present in perfectly aligned beam waveguides, do not exist in misaligned guides. However, it can be shown that there are beams whose expected field distribution is repeated from lens to lens. These 'statistical modes' are determined by the eigenfunctions of a homogeneous integral equation of the second kind. The corresponding eigenvalues determine the expected attenuation per iteration. The absolute squares of the eigenvalues yield an upper bound for the expected power loss per iteration. The integral equation is solved for small mean square displacements of the lenses by a perturbation method. For infitely extended lenses, the equation can be solved in closed form. In both cases the expected attenuation of the lower-order statistical modes has been calculated; the results are shown as function of the mean square displacement of the lenses.
AD-653 345 Not available from CFSTI.

BEAM WAVEGUIDE EXCITATION BY THE APERTURE FIELD OF A TUBULAR WAVEGUIDE,
American Museum of Natural History New York Dept of Animal Behavior
F. Schwering, and A. Zarfler. 23 Aug 66, 2p
Availability: Published in IEEE Transactions on Microwave Theory and Techniques vMTT*15 n3 p191-2 Mar 1967.

Descriptors: (*Waveguides, Electromagnetic waves), Mathematical analysis, Efficiency, Microwaves, Electric fields, Beams (Electromagnetic).

The excitation of a lens-type beam waveguide by the aperture field of a conventional waveguide of circular cross section is treated, assuming that a superposition of an H11-mode and a E11-mode is propagating in the metallic waveguide. The launching efficiency for the dominant beam mode depends on the amplitude ratio of the H11- and E11-modes and on the ratio of the beam mode parameter to the radius of the tubular waveguide. If both quantities are chosen appropriately a theoretical launching efficiency of 98.3 percent can be achieved. (Author)
AD-653 349 Not available from CFSTI.

SOLID HELIX MAGNETS FOR LARGE VOLUME PULSED HIGH FIELDS.
Revised ed.,
Massachusetts Inst of Tech Cambridge National Magnet Lab
S. Foner, and W. G. Fisher. 17 Oct 66, 4p Rept no. JP-213
AFOSR-67-1236
Contract AF 49 (638)-1468
Revision of manuscript submitted 1 Sep 66.
Availability: Published in The Review of Scientific Instruments v38 n3 p440-2 Mar 1967.

Descriptors: (*Magnets, *Coils), Solenoids, Beryllium, Copper, Electric insulation, Costs, Mica, Electromagnetic pulses, Thermal properties, Electric fields, Tests.

The design and performance of solid helix pulsed field magnets are described. Data for coils with 3 in. O.D. and 5/8 to 1 1/2 in. I.D. are presented. A maximum field of 550 kG with a 480 usec half-period is attained for a 75 kJ discharge through a 3/4 in. I.D. coil. (Author)
AD-653 357 Not available from CFSTI.

A COMPUTER PROGRAM FOR GENERATING INHERENT CORRECTIVE MAINTENANCE WORKLOAD TIMES. II. THE APPLICATION OF ARMAN TO MAINTAINABILITY ANALYSIS OF TWO RADAR SYSTEMS.
University of Southern California, Los Angeles. Electronics Personnel Research Group.
For primary bibliographic entry see Field 9B.
AD-806 959 HC$3.00 MF$0.65

INVESTIGATION OF CONTACT FAILURES ON RESISTORS FINAL TECHNICAL STATUS REPORT.
Philco Corp., Santa Clara, Calif. Microelectronics Div.
19 Oct 66, 29p NASA-CR-84144
Contract NAS5-9322

Descriptors: *Electric contact, *Failure mode, *Metal film, *Resistor, Aluminum, Contact, Deposition, Electric, Failure, Film, Geometry, Metal, Mode, Silicon.

For abstract, see STAR 05 14.
N67-26520 HC$3.00 MF$0.65

NEW COATING PROCESS FOR FOAMED POLYETHYLENE INSULATED TELEPHONE CABLE.
Sumitoto Electric Industries, Ltd., Yokohama (Japan).
For primary bibliographic entry see Field 17B.
For abstract, see STAR 05 14.
N67-26764 HC$3.00 MF$0.65

APPLICATION OF WELDED THIN METAL IN NEW COMMUNICATION CABLE DESIGNS.
Canada Wire and Cable Co., Ltd., Toronto (Ontario).
A. Busby, J. Derek, G. Lehnert, L. E. Marrin, and J. V. Mc Bride. Dec 67, 12p AD-646538
Presented At the 15th Ann. Wire and Cable Symp., Atlantic City, 7-9 Dec. 1966 Prepared Jointly With Hackethal-draht-und Kabel-werke Aktienges.

Descriptors: *Coaxial cable, *Communication system, *Manufacturing, *Metal coating, *Protective coating, *Welded structure, Cable, Coating, Coaxial, Communication, Conference, Copper, Cross, Design, Envelope, Equipment, Manufacture, Metal, Method, Nickel, Protection, Sheath, Stainless, Steel, Structure, System, Talk, Thin, Tube, Wall, Welding.

For abstract, see STAR 05 14.
N67-26788 HC$3.00 MF$0.65

UNDERWATER DEGRADATION OF POLYETHYLENE FOR WIRE INSULATION.
Furukawa Electric Co., Ltd., Tokyo (Japan).
For primary bibliographic entry see Field 11I.
For abstract, see STAR 05 14.
N67-26801 HC$3.00 MF$0.65

PROTECTION OF TELEPHONE CABLES FROM ATTACK BY INSECTS.
Postmaster-generals Dept., Melbourne (Australia).
For primary bibliographic entry see Field 17B.
For abstract, see STAR 05 14.
N67-26807 HC$3.00 MF$0.65

STUDIES OF INFRARED IMAGE CONVERTER. (SOLID-STATE TYPE AND VACUUM TYPE) PROGRESS REPORT, 19 JUN. - 18 DEC. 1966.
Matsushita Research Inst. Tokyo, Inc., Kawasaki (Japan). Electron Device Lab.
K.-I. Miyaji. Dec 66, 157p J-255-3, AD-647649
Contract DA-92-557-FEC-38337

Descriptors: *Diode, *Image converter, *Infrared instrument, *Solid state device, Aluminum, Cadmium, Converter, Device, Image, Infrared, Instrument, Optical, Phosphorescence, Photoconuuctor, Quenching, Silicon, Solid, State, Sulfide, Tellurium, Tube, Vacuum.

For abstract, see STAR 05 14.
N67-26870 HC$3.00 MF$0.65

ELECTRO-OPTIC AND MAGNETO-OPTIC MODULATORS.
National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
E. Hirschmann. Jun 67, 14p NASA-TN-D-3775
Contract 125-21-02-27-51

Descriptors: *Electro-optics, *Gallium arsenide, *Gallium phosphide, *Light modulator, *Potassium compound, Arsenide, Compound, Crystal, Electronics, Gallium, Iron, Laser, Length, Light, Material, Modulator, Niobate, Phosphide, Potassium, Tantalum, Wave, Yttrium.

For abstract, see STAR 05 14.
N67-27273 HC$3.00 MF$0.65

RESEARCH IN THE DEVELOPMENT OF AN IMPROVED MULTIPLIER PHOTOTUBE FINAL REPORT.
ITT Industrial Labs., Fort Wayne, Ind.
F. H. Barr, and E. H. Eberhardt. 16 Nov 66, 79p NASA-CR-84406, ITTIL-66-1058
Contract NASW-1038

Descriptors: *Cascade, *Electron tube, *Gain, *Photomultiplier, Aperture, Calibration, Cooling, Counting, Design, Effect, Efficiency, Electron, Gas, Photon, Phototube, Pressure, Quantum, Test, Tube.

For abstract, see STAR 05 14.
N67-27365 HC$3.00 MF$0.65

FLAT CONDUCTOR CABLE MANUFACTURE AND INSTALLATION TECHNIQUES.
National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
W. Angele. 1966, 45p NASA-TM-X-59697, AD-646533
Presented At 15th Ann. Wire and Cable Symp., Atlantic City, 7-9 Dec. 1966

Descriptors: *Electric conductor, *Manufacturing, Cable, Conductor, Connector, Electric, Flat, Installation, Launch vehicle, Terminal.

For abstract, see STAR 05 14.
N67-27473 HC$3.00 MF$0.65

TUNNEL DIODE LOW-LEVEL DETECTION.
National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
W. F. Gabriel. Jun 67, 45p NASA-TN-D-3905
Contract 520-125-22-01-07

Descriptors: *Detection, *Tunnel diode, Bandwidth, Bias, Carrier, Circuit, Current, Diode, Gain, Hot, Low level, Noise, Rectification, Sensitivity, Tunnel.

For abstract, see STAR 05 14.
N67-27613 HC$3.00 MF$0.65

PHOTON-COUPLED ISOLATION SWITCH QUARTERLY REPORT, 1 OCT. - 31 DEC. 1966.
Texas Instruments, Inc., Dallas. Semiconductor-components Div.
E. L. Bonin. 31 Dec 66, 16p NASA-CR-84498, TI-03-67-39
Contracts NAS7-100, JPL-951340
Prepared for Jpl

Descriptors: *Electronic switch, *Integrated circuit, *Optical coupling, Arsenide, Circuit, Coupling, Detection, Diode, Electric, Electronic, Gallium, Generation, Isolation, Optical, Photon, Phototransistor, Silicon, Switch.

For abstract, see STAR 05 14.
N67-27649 HC$3.00 MF$0.65

9B. COMPUTERS

GRAPHICAL DATA PROCESSING RESEARCH STUDY AND EXPERIMENTAL INVESTIGATION.
Quarterly progress rept., no. 6, 1 Oct-31 Dec 64, Stanford Research Inst., Menlo Park, Calif.
A. E. Brain, R. O. Duda, H. Fossum, and J. H. Munson. Jan 65, 44p Rept. no. 18
Contract DA-36-039-AMC-03247 (E)

Descriptors: (*Graphics, Data processing systems), (*Information retrieval, Graphics), Computers, Design, Programming (Computers), Military requirements, Learning, Pattern recognition, Computer logic, Coding, Data storage systems, Aerial photographs, Aerial reconnaissance, Simulation, Calibration, Analog-to-digital converters, Magnetic core storage, Adaptive systems, Learning machines.
Identifiers: Minos.

The MINOS II/SDS 910 interface is now operational, including the ternary buffer, the A-to-D converter and multiplexer. The diagnosis of faults in the system and routine maintenance may now be performed much more efficiently, and it is possible to provide continuous bookkeeping and diagnostics throughout actual experiments. Some initial examples are described. A successful simulation of MINOS II at full scale has been achieved with an operating rate of 4 patterns per second. This simulation will provide a standard of comparison against which the performance of MINOS II may be checked. Some typical results are given. Three practical problems in upgrading the performance of the 1024-image optical preprocessor are discussed: stability and sensitivity at the diffuser output, and circuit difficulties associated with the storage tube. (Author)
AD-460 387 HC$3.00

MILDATA STUDY. VOLUME II.
Honeywell Electronic Data Processing, Wellesley Hills, Mass.
For primary bibliographic entry see Field 15C.
AD-462 043 HC$3.00

TME-300 COMPUTER EVALUATION OF TELECTRO-MEK, INC. RAM DRAG AND THRUST COMPUTERS.
Naval Air Turbine Test Station, Trenton, N. J. Aeronautical Turbine Lab.
For primary bibliographic entry see Field 21E.
AD-466 202 HC$3.00 MF$0.65

A PROPOSED CHEMICAL INFORMATION AND DATA SYSTEM, VOLUME I.
Pennsylvania Univ., Philadelphia. Inst. for Cooperative Research.
For primary bibliographic entry see Field 5B.
AD-479 679 HC$3.00 MF$0.65

IBM 704 COMPUTER CIRCUIT ANALYSIS PROGRAM NO. 0400,

Navy Underwater Sound Lab., New London, Conn.
For primary bibliographic entry see Field 9E.
AD-644 203 HC$3.00 MF$0.65

LIST PROCESSING RESEARCH TECHNIQUES.
Quarterly progress rept. no. 2, 15 Sep-14 Dec 66,
Pennsylvania Univ Philadelphia Moore School of Electrical Engineering
J. W. Carr, III, and H. J. Gray. May 67, 153p
Rept no. 67-19
ECOM-02377-2
Contract DA-28-043-AMC-02377 (E)

Descriptors: (*Computer storage devices, Reports), Computers, Data storage systems, Computer programs, Digital computers, Programming (Computers), Tables, Programming languages.
Identifiers: SPRINT, IBM 7040.

The second report is of an investigation on the formal characteristics and feasibility of the potential and utilization of push-down type computer memories. Development of software techniques for symbol data manipulation under this study-period concerns the refinement of the SPRINT language. A SPRINT interpreter has been re-written for operation on the IBM 7040. Work has been continued on the Growing Machine whose development is considered to be a test-bed for list processing development. Additional work related to the Growing Machine concept includes an ALGOL recognizer, addition of new push-down operations to the Growing Machine simulator, an analysis of alternate push-down logics, and construction of more complicated mechanisms out of push-downs; using the Growing Machine. A concept of an 'all push-down' machine, in which at least all but a very few of the static registers become a push-down list, and where the 'main memory' is a set of addressed or labeled push-downs, has begun to take shape. The solution to the problem of interconnection, cycling, and contents-interpretation of the push-down lists is to be provided in the two simulated systems under study. The usefulness of push-down memories in conventional and/or unconventional processors is being examined through applications of push-down features in problem areas such as sorting, information retrieval, computation, and language translation. Other applications of list memories under study include push-down list memories as conventional address memories and as secondary storage devices. Linking of lists and using a 100K word associative memory using 1000 hardware FIFOs (first-in, first-out) are also discussed. (Author)
AD-652 724 HC$3.00 MF$0.65

GENERATING FUNCTIONS WITH INTEGRATORS,
Harry Diamond Labs Washington D C
For primary bibliographic entry see Field 9E.
AD-652 729 HC$3.00 MF$0.65

A PRAGMATIC FIRST LOOK AT DIAGNOSTIC PROGRAMMING FOR DIGITAL COMPUTERS.
Technical rept.,
Military Academy West Point N Y Dept of Electricity
Philip H. Enslow, Jr., and Alan B. Salisbury. May 67, 66p Rept no. Elec-67-3

Descriptors: (*Computers, Test methods), (*Malfunctions, Computers), Computer logic, Logic circuits, Failure (Electronics), Maintenance, Simulation.

A brief survey of diagnostic programming for digital computers. The purposes and organization of the program are covered as well as many of the problems attendant to their preparation. Various techniques that have been used to overcome these are discussed with emphasis on those that are practical (at least from the point of view of effort required) and those that have seen wide use. The primary purpose of this paper is to fully define the nature of the problem and the special considerations involved. Most of the discussion is fully applicable to both commercial and military equipment. (Author)
AD-652 730 HC$3.00 MF$0.65

A DELAYED COMMAND SYSTEM FOR A NEAR-EARTH SATELLITE.
Johns Hopkins Univ Silver Spring Md Applied Physics Lab
For primary bibliographic entry see Field 22C.
AD-652 816 HC$3.00 MF$0.65

HIGH SPEED DIGITAL FILTERING BY CONVOLUTION APPROXIMATION.
Final rept., Jan 64-Jun 66,
Aerospace Medical Research Labs Wright-Patterson AFB Ohio
E. B. Weis, Jr. Feb 67, 21p Rept no. AMRL-TR-66-140

Descriptors: (*Filters (Electromagnetic wave), *Data processing systems), Approximation (Mathematics), Fourier analysis, Accuracy, Functions, Numerical analysis.
Identifiers: Digital filters.

This report discusses a technique for digital filtering by convolution approximation which is an acceptable compromise between accuracy and speed. This technique is applicable where high accuracy is not necessary and where a digital computer with elaborate processing capability is not available. Most requirements for digital filtering can be developed in terms of the approximations suggested in this report. By casting the required filter in a form that is most amenable to numerical computation, the accuracy of approximation is maximized. If power-of-two accuracy is insufficient there is a continuous tradeoff between accuracy and speed which involves range division and more bits in the approximation. (Author)
AD-652 856 HC$3.00 MF$0.65

A PASSIVE METHOD OF IMPROVING COMMON-MODE REJECTION,
Harry Diamond Labs Washington D C
For primary bibliographic entry see Field 9A.
AD-652 877 HC$3.00 MF$0.65

PROCEEDINGS OF THE SYMPOSIUM ON MANAGING THE DEVELOPMENT OF LARGE COMPUTER PROGRAM SYSTEMS, JANUARY 21-23 1963,
System Development Corp Santa Monica Calif
Joseph J. Maher. 1963, 63p

Descriptors: (*Computer programs, Symposia), (*Management engineering, *Programming (Computers)), Systems engineering, Data processing systems, Command + control systems, Programmers, Computer personnel, Manpower, Problem solving.

Summarizes the three-day symposium held 21-23 January 1963, at System Development Corporation, Washington Division. Condenses the eight papers that were presented and arranges them in a topical sequence.
AD-652 982 HC$3.00 MF$0.65

A FORTRAN II PROGRAM FOR THREE-MODE FACTOR ANALYSIS.
Illinois Univ Urbana Dept of Psychology
For primary bibliographic entry see Field 5J.
AD-653 100 HC$3.00 MF$0.65

COMPUTING TWO-COMMODITY FLOWS,
Virginia Univ Charlottesville
For primary bibliographic entry see Field 12A.
AD-653 117 HC$3.00 MF$0.65

FUNCTION APPROXIMATION BY A POLYGONAL CURVE,
Ballistic Research Labs Aberdeen Proving Ground Md
For primary bibliographic entry see Field 12A.
AD-653 140 HC$3.00 MF$0.65

INTRODUCTION TO EXTENDED, TIME-SHARED PROCESSOR SYSTEMS.
Technical rept.,
Army Electronics Command Fort Monmouth NJ
Robert M. Dunn. Feb 67, 20p Rept no. ECOM-2806

Descriptors: (*Time sharing, *Data processing systems), Motivation, Communication systems, Data storage systems, Management planning.
Identifiers: Multiprocessing.

The extended, time-shared processor system is motivated and defined. The purpose of the discussion is to characterize and evaluate this concept. In the course of the discussion, current time-shared systems, their characteristics, some of their technical implications, and some of their problems are reviewed. The review yields implications as to the essential characteristics of the extended, time-shared processor system. The discussion ends with the conclusion that the extended, time-shared processor system is a limited instance of a more generalized set of adaptive, parallel processor systems which seek to automatically and dynamically distribute their load throughout the processor network. (Author)
AD-653 142 HC$3.00 MF$0.65

SELF-REPAIR TECHNIQUES INVESTIGATION.
Quarterly rept. no. 3, 1 Dec 66-28 Feb 67,
Westinghouse Electric Corp Baltimore Md Surface Div
F. B. Cole, R. M. Heller, and S. E. Zimmerman.
Jun 67, 97p Rept no. MDE-2239
ECOM-02343-3
Contract DA-28-043-AMC-02343 (E)

Descriptors: (*Digital computers, *Maintenance), Computer storage devices, Programming (Computers), Tables, Errors, Computers.

The report describes a set of techniques which can be used to design and construct self-repairing digital systems via spare parts switching. A discussion is presented of reliability results obtained from simulation of different switching strategies. A description of the proposed self-repair demonstration model computer is given with its associated fault detecting and locating techniques applied to each section of the computer. The appendix of this report is devoted entirely to techniques of self-repair in memory system via coding and in conjunction with spare switching. (Author)
AD-653 158 HC$3.00 MF$0.65

STATISTICAL CONSIDERATIONS IN COMPUTER SIMULATION EXPERIMENTS,
Rand Corp Santa Monica Calif
For primary bibliographic entry see Field 12B.
AD-653 174 HC$3.00 MF$0.65

NETWORKS, FRAMES, BLOCKING SYSTEMS,
Rand Corp Santa Monica Calif
For primary bibliographic entry see Field 12B.
AD-653 178 HC$3.00 MF$0.65

GRAPHICS.
Semiannual technical summary rept., 1 Dec 66-31 May 67,
Massachusetts Inst of Tech Lexington Lincoln Lab
Jack I. Raffel. 31 May 67, 8p

ESD-TR-67-275
Contract AF 19(628)-5167, ARPA Order-691

Descriptors: (*Time sharing, *Graphics), (*Man-machine systems, Computer programs), Display systems, Programming (Computers), Compilers, Scanning, Input-output devices, Control sequences, Programming languages.

The objective the Graphics program at Lincoln Laboratory is the development of computer hardware and programs which will enable users to work on-line in an interactive mode employing graphical techniques for the input, manipulation and representation of graphical data. The work includes the investigation of problems related to using a time-shared computer, such as TX-2, for graphics, and the design of general-purpose system programs to provide graphics capability for a variety of scientific, military and control problems. During the last reporting period, the following has been accomplished: A general-purpose fron-tend system has been designed based on the VITAL system. VITAL itself has been expanded to allow a compiler to control the scanning of a source program and outputting of messages. An ALGOL-like language, LABGOL, has been implemented; with the additon of means for building and manipulating a store of explicit relations between objects and their attributes, a new language, LEAP, has also been specified. The new hybrid conic generator has been operated successfully on-line.
AD-653 191 HC$3.00 MF$0.65

STUDY OF LASA DATA LINKS.
Philco-Ford Corp Blue Bell Pa Communications and Electronics Div
For primary bibliographic entry see Field 8K.
AD-653 223 HC$3.00 MF$0.65

DESIGN PRINCIPLES FOR LEARNING SYSTEMS,
Battelle Memorial Inst Columbus Ohio
J. T. Tou. 1965. 16p
Research supported in part by ONR.
Availability: Published in Proceedings of IFAC Tokyo Symposium on Systems Engineering for Control System Design p171-85 1965.

Descriptors: (*Learning, Humans), (*Learning machines, Systems engineering), Design, Control systems, Information retrieval, Data storage systems, Digital computers, Decision making, Computer logic, Decision theory, Programming (Computers), Switching circuits, Automation, Artificial intelligence.

The paper reviews the major aspects of human learning, and discusses several learning mechanisms and some of the design principles for learning systems. A comparison is made between human learning and machine learning. Some aspects of human learning are considered in the design of learning system. For the purpose of engineering design, learning is referred to as the acquisition of skill to perform meaningful self-modification and to improve performance on the basis of past experience. The three basic learning mechanisms are learning by rote (zeroth-order learning), learning by selective reinforcement (first-order learning), and learning by generalization (second-order learning). The storage and retrieval of past data and information pattern in a digital computer, the reward and punishment scheme, and the statistical inference and Bayesian decision process are considered as the engineering counterparts of these learning mechanisms. The foundations for the design of learning systems are threshold logic, switching theory, decision theory, Bayesian statistics, stochastic automata, and heuristic programming. (Author)
AD-653 258 Not available from CFSTI.

RADIOLOGICAL RECOVERY REQUIREMENTS, STRUCTURES AND OPERATIONS RESEARCH. VOLUME I: CALCULATIONAL TECHNIQUE FOR DETERMINING IMPORTANCE OF LIMITED STRIP DECONTAMINATION PROCEDURES.
Research Triangle Inst Durham N C Operations Research and Economics Div
For primary bibliographic entry see Field 6R.
AD-653 274 HC$3.00 MF$0.65

RADIOLOGICAL RECOVERY REQUIREMENTS, STRUCTURES AND OPERATIONS RESEARCH. VOLUME II: DAMAGED PF MULTIPLIER.
Research Triangle Inst Durham N C Operations Research and Economics Div
For primary bibliographic entry see Field 6R.
AD-653 275 HC$3.00 MF$0.65

RADIOLOGICAL RECOVERY REQUIREMENTS, STRUCTURES AND OPERATIONS RESEARCH: INTRODUCTION AND SUMMARY.
Research Triangle Inst Durham N C Operations Research and Economics Div
For primary bibliographic entry see Field 6R.
AD-653 276 HC$3.00 MF$0.65

A GENERAL DIGITAL COMPUTER PROGRAM, CODAT, FOR SOLVING NOISE TRANSMISSION PROBLEMS.
Navy Marine Engineering Lab Annapolis Md
For primary bibliographic entry see Field 20A.
AD-653 294 HC$3.00 MF$0.65

A COMPUTER PROGRAM FOR GENERATING INHERENT CORRECTIVE MAINTENANCE WORKLOAD TIMES. II. THE APPLICATION OF ARMAN TO MAINTAINABILITY ANALYSIS OF TWO RADAR SYSTEMS.
Technical rept.,
University of Southern California, Los Angeles. Electronics Personnel Research Group.
Joseph W. Rigney, Robert H. Cremer, Douglas M. Towne, and Anthony K. Mason. Nov 66. 95p TR-50
Contract Nonr-228(22)

Descriptors: (*Computer programs, Maintenance), (*Failure (Electronics), Computer programs), Integrated circuits, Maintainability, Electron tubes, Transistors, Replacement theory, Microminiaturization (Electronics).
Identifiers: Arman (Artificial methods analyst), MTBF, MTTR.

The report discribes an application of ARMAN to the evaluation of electronics equipment maintainability. A comparative analysis of the effects of two different circuit technologies on the corrective maintenance task cycle (MTC) is described. Circuit technologies represented are the hybrid vacuum tube-transistor type and the integrated circuit (IC) type. Vehicles for the comparison are the conventional circuitry F15A and the IC-based R45 airborne radars. The inherent corrective maintenance workload (ICMW) serves as the comparison denominator throughout the study. All possible component failures affecting each radar's Ground Mapping Mode were analyzed for corrective maintenance task sequences. Detailed MTC's and their performance times were synthesized by ARMAN for all failures. In addition, ARMAN was used to investigate the maintenance time effects of various design alternatives facilitated by the IC technology. The alternatives studied were four levels of R45 Built-In-Test (BIT) and four levels of R45 modularization. The study shows that the IC technology can contribute many significant improvements in equipment maintainability and that ARMAN is effective in evaluating them.
AD-806 959 HC$3.00 MF$0.65

COMPUTER PROGRAM FOR THE KINETIC TREATMENT OF RADIATION-INDUCED SIMULTANEOUS CHEMICAL REACTIONS,
Argonne National Lab., Ill.
For primary bibliographic entry see Field 7E.
For abstract, see NSA 21 02.
ANL-7199 HC$3.00 MF$0.65

DUAL ONE DIMENSIONAL ANALYSIS AND DISPLAY PROGRAM,
Battelle-Northwest, Richland, Wash. Pacific Northwest Lab.
D. N. Samsky. Sep 66. 38p
Contract AT(45-1)-1830

Descriptors: (*Analog-to-digital converters, Programming (Computers)), (*Data storage systems, Control).

For abstract, see NSA 20 24.
BNWL-299 HC$3.00 MF$0.65

FAST FLUX TEST FACILITY. ADOPT PROGRAM FOR STEADY-STATE PROCESS DESIGN AND COST OPTIMIZATION OF FFTF HEAT REMOVAL SYSTEMS USING HEAT DUMPS TO AIR,
Battelle-Northwest, Richland, Wash. Pacific Northwest Lab.
For primary bibliographic entry see Field 18I.
For abstract, see NSA 21 04.
BNWL-308 HC$3.00 MF$0.65

TRUNK FORTRAN PROGRAM FOR THE BUCKLING OF TRUNCATED SPHERES,
Battelle-Northwest, Richland, Wash. Pacific Northwest Lab.
For primary bibliographic entry see Field 18H.
For abstract, see NSA 21 12.
BNWL-330 HC$3.00 MF$0.65

RAVEN A COMPUTER PACKAGE FOR EVALUATING RESOLVED AND UNRESOLVED RESONANCE ABSORPTION INCLUDING PIN SHADOWING,
Phillips Petroleum Co., Idaho Falls, Idaho. Atomic Energy Div.
For primary bibliographic entry see Field 18I.
For abstract, see NSA 21 12.
IDO-17212 HC$3.00 MF$0.65

TWO ALGORITHMS FOR COMPUTING THE GENERALIZED INVERSE OF A MATRIX,
Oak Ridge Gaseous Diffusion Plant, Tenn.
Bert Woodard Rust. 9 Nov 66. 41p
Contract W-7405-eng-26

Descriptors: (*Algorithms, Matrix algebra), (*Matrix algebra, Permutations).

For abstract, see NSA 21 02.
K-1641 HC$3.00 MF$0.65

A USERS MANUAL FOR ANISN A ONE DIMENSIONAL DISCRETE ORDINATES TRANSPORT CODE WITH ANISOTROPIC SCATTERING,
Oak Ridge Gaseous Diffusion Plant, Tenn.
For primary bibliographic entry see Field 20H.
For abstract, see NSA 21 12.
K-1693 HC$3.00 MF$0.65

SERVO CONTROL AND DATA SYNCHRONIZATION STUDY.
Borg-Warner Controls Div., Borg-Warner Corp., Santa Ana, Calif. Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
B. Bejach. 21 Feb 67. 31p NASA-CR-84145, REPT.-70-007-Q1
Contracts NAS7-100, JPL-951659
Prepared for Jpl

Descriptors: *Data processing, *Magnetic tape recorder, *Servocontrol, *Synchronization, Data,

Error, Magnetic, Processing, Recorder, Retrieval, Signal, Speed, Storage, Tape.

For abstract, see STAR 05 14.
N67-26519 HC$3.00 MF$0.65

A COMPUTER-CONTROLLED CENTRAL DIGITAL DATA ACQUISITION SYSTEM.
National Aeronautics and Space Administration. Lewis Research Center, Cleve land, Ohio.
L. Kee, and C. Mealey. May 67, 17p NASA-TN-D-3904
Contract 125-23-02-06-22

Descriptors: *Data acquisition, *Data recording, *Digital computer, Acquisition, Central, Computer, Control, Data, Digital, Display, Facility, Magnetic, Measurement, Pressure, Recording, Storage, System, Tape, Test, Voltage.

For abstract, see STAR 05 14.
N67-26541 HC$3.00 MF$0.65

DOCUMENTATION FEATURES FOR COMPUTER PROGRAMS.
National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
A. Hisler. Apr 67, 39p NASA-TM-X-55771, X-565-67-170

Descriptors: *Computation, *Computer program, *Data processing, *Decoding, Analysis, Computer, Data, Display, Documentation, Engineering, Input, List, Output, Processing, Program, Retrieval.

For abstract, see STAR 05 14.
N67-26586 HC$3.00 MF$0.65

ADVANCED SPACE INFORMATION SYSTEMS.
National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
G. H. Ludwig. Apr 67, 20p NASA-TM-X-55774, X-560-67-209

Descriptors: *Data handling system, *Information processing, *Real time, Acquisition, Automation, Center, Computer, Control, Data, Display, Dynamic, Electronic, Equipment, Evolution, Ground, Handling, Information, Onboard, Orbit, Processing, Real, Reduction, Space, Station, System, Time.

For abstract, see STAR 05 14.
N67-26587 HC$3.00 MF$0.65

MONTE CARLO SIMULATION FOR APOLLO GO, NO- GO VERIFICATION.
National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
For primary bibliographic entry see Field 22A.
For abstract, see STAR 05 14.
N67-26639 HC$3.00 MF$0.65

RELIABLE COMPUTATION WITH UNRELIABLE ELEMENTS.
Imperial Coll. of Science and Technology, London (England). Electrical Engineering Dept.
J. D. Cowan. Jul 66, 17p AD-646625
Contract N62558-4256

Descriptors: *Computer design, *Error correcting device, *Reliability, Computer, Control, Correction, Design, Device, Element, Error, Failure, Fault, Logic, Malfunction, Network, Redundancy, Stationary, Transient.

For abstract, see STAR 05 14.
N67-26806 HC$3.00 MF$0.65

STUDY OF A SIGNAL PROCESSOR EMPLOYING A SYNTHETIC PHASE ISOLATOR.
Raytheon Co., Norwood, Mass.
For primary bibliographic entry see Field 9F.
For abstract, see STAR 05 14.
N67-27267 HC$3.00 MF$0.65

APPLICATION OF THE STORED-PROGRAM COMPUTER TO SMALL SCIENTIFIC SPACECRAFT.
National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
R. A. Cliff. Jun 67, 16p NASA-TN-D-3988
Confract 125-23-03-08-51

Descriptors: *Computer program, *Data storage, *Spacecraft electronic equipment, Buffer, Computer, Control, Data, Electronic, Equipment, Extraction, Flexibility, Format, Memory, Parameter, Program, Redundancy, Removal, Spacecraft, Storage, System.

For abstract, see STAR 05 14.
N67-27275 HC$3.00 MF$0.65

LAMINATED FERRITE MEMORY FABRICATION.
Radio Corp. of America, Princeton, N. J.
C. Wentworth. Sep 65, 11p NASA-CR-84457

Descriptors: *Electric conductor, *Ferrite, *Laminated material, *Memory storage unit, Array, Conductor, Electric, Fabrication, Lamination, Material, Memory, Powder, Preparation, Sheet, Slurry, Storage, Unit.

For abstract, see STAR 05 14.
N67-27543 HC$3.00 MF$0.65

METHODS OF PROCESSING SATELLITE DATA.
National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
H. J. Goett, and E. J. Habib. Mar 67, 50p NASA-TM-X-55786, X-100-65-343
Presented At 16th Intern. Astron. Congr., Athens, Sep. 1965 Revised

Descriptors: *Computer method, *Data processing, *Space probe, Analysis, Automatic, Bandwidth, Computer, Data, Increase, Method, Observation, Probe, Processing, Rate, Reduction, Research, Satellite, Space, Technique, Transmission.

For abstract, see STAR 05 14.
N67-27562 HC$3.00 MF$0.65

FIELD INFRARED ANALYSIS OF TERRAIN - SPECTRAL CORRELATION PROGRAM. PART II - STANFORD ADAPTATION AND CORRECTIONS FOR USE ON LMSC PROGRAM ON IBM 7090 - 32 K MEMORY COMPUTER. PART III-VOLTAGE DRIFT CORRECTION PROCEDURES.
Stanford Univ., Calif. Remote Sensing Lab.
1967, 49p NASA-CR-84486, REPT.-67-2
Contract NGR-05-020-115

Descriptors: *Adaptation, *Computer program, *Ibm 7090 computer, *Magnetic tape recorder, *Spectral analysis, Analysis, Computer, Correction, Correlation, Drift, Field, Infrared, Magnetic, Program, Recorder, Spectral, Tape, Terrain, Voltage.

For abstract, see STAR 05 14.
N67-27643 HC$3.00 MF$0.65

BEMAT PROGRAMMER'S REFERENCE MANUAL.
Technische Hochschule Stuttgart (West Germany).
N. W. Hubacker, H. A. Kamel, G. M. Larssen, P. C. Patton, and J. B. Spooner. Jan 66, 91p
REPT.-19
Revised

Descriptors: *Computer program, *Matrix, *Univac 1107 computer, Code, Computer, Control, Data, Error, Geometry, Least, Mnemonics, Program, Square, Storage, Transfer.

For abstract, see STAR 05 14.
N67-27689 HC$3.00 MF$0.65

EIGENREDUCTION OF COMPLEX MATRICES BY THE A-P ALGORITHM - A FORTRAN IV PROGRAM.
Technische Hochschule Stuttgart (West Germany).
O. E. Bronlund, and P. C. Patton. Dec 66, 29p
REPT.-32

Descriptors: *Algorithm, *Eigenvector, *Fortran, *Matrix analysis, *Subroutine, Analysis, Approximation, Complex, Derivation, Eigenvalue, Matrix, Normalization, Program.

For abstract, see STAR 05 14.
N67-27776 HC$3.00 MF$0.65

ORNL VERSION OF THEME 1 CODE A THERMAL-HYDRAULIC CODE FOR ANALYSIS OF THE HOT CHANNEL IN A FUEL BUNDLE,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 18I.
For abstract, see NSA 21 04.
ORNL-4015 HC$3.00 MF$0.65

A SYSTEM FOR BIOMEDICAL DATA MANAGEMENT (DATASYS),
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 6-.
For abstract, see NSA 21 12.
ORNL-4064 HC$3.00 MF$0.65

FORTRAN PROGRAM FOR CALCULATING THE SOLID ANGLE SUBTENDED BY ONE CIRCULAR DISC AT ANOTHER,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 12A.
For abstract, see NSA 21 12.
ORNL-4099 HC$3.00 MF$0.65

INTRODUCTION TO THE THEORY OF SPEED INDEPENDENT ASYNCHRONOUS SWITCHING CIRCUITS.
Technical rept.,
Princeton Univ., N. J., Digital Systems Lab.
A. D. Hall, Jr. Jul 66, 32p TR-50
Supported in part by the National Science Foundation.

Descriptors: (*Switching circuits, Stability), (*Input-output devices, Switching circuits), Mathematical models, Mathematical prediction, Sequence switches, Feedback, Electrical networks, Hazards, Computer logic.

This paper presents a review of the fundamentals of the theory of speed-independent circuits. A brief comparison of this model and other models is included. Particular attention is given to the correspondence between the mathematical model and the physical devices represented, in order to show how actual behavior may differ from the predicted behavior. Proposed changes to the underlying assumptions that could account for some of these differences are given.
PB-173 586 HC$3.00 MF$0.65

GENERAL VEHICLE DYNAMIC MODEL,
Massachusetts Inst. of Tech., Cambridge. Engineering Projects Lab.
For primary bibliographic entry see Field 13F.
PB-173 650 HC$3.00 MF$0.65

COMPUTER TECHNIQUES APPLIED TO THE ANALYSIS AND DESIGN OF TWO COLUMN BENT RIGID FRAME HIGHWAY BRIDGE PIERS AND OTHER BRIDGE DESIGN PROBLEMS,
South Carolina Univ., Columbia. Dept. of Civil Engineering.
For primary bibliographic entry see Field 13B.
PB-173 863 HC$3.00 MF$0.65

DEVELOPMENT OF NOTATION AND DATA STRUCTURE FOR COMPUTER APPLICATIONS TO BUILDING PROBLEMS.
Bolt Beranek and Newman, Inc., Van Nuys, Calif.
For primary bibliographic entry see Field 13M.
PB-174 795 HC$3.00 MF$0.65

COMPUTER PROGRAM FOR CALCULATING THE ATMOSPHERIC DISPERSION OF LARGE CLOUDS,
California Univ., Livermore. Lawrence Radiation Lab.
For primary bibliographic entry see Field 18C.
For abstract, see NSA 21 12.
UCRL-50179 HC$3.00 MF$0.65

AN INSPECTION DATA LOGGING SYSTEM (DLS),
Union Carbide Corp., Oak Ridge, Tenn. Y-12 Plant.
For primary bibliographic entry see Field 13I.
For abstract, see NSA 21 12.
Y-1565 HC$3.00 MF$0.65

9C. ELECTRONIC AND ELECTRICAL ENGINEERING

LARGE-AREA ELECTRONIC DISPLAY PANEL.
General Electric Co., Syracuse, N. Y.
For primary bibliographic entry see Field 9A.
AD-451 545 HC$3.00

UPGRADING OF POLYMERIC MATERIALS FOR ELECTRICAL APPLICATIONS.
Radiation Applicationr, Inc., Long Island City, N. Y.
For primary bibliographic entry see Field 11I.
AD-463 790 HC$3.00

NON-LINEAR ANALYSIS OF HETEROPOLAR ELECTROMECHANICAL ENERGY CONVERTERS. PART I. ANALYSIS OF LARGE DC MACHINES.
Final rept. on phase A,
Colorado Univ., Boulder. Dept. of Electrical Engineering.
Edward A. Erdelyi. Aug 66, 88p
Contract Nonr-1147 (14)
See also AD-646 371.

Descriptors: (*Electromechanical converters, Numerical analysis), Electric motors, Direct current, Computer programs, Field theory, Nonlinear programming.

Contents: Analysis in polar coordinates; Summary of the overall analysis procedure, Application of electromagnetic field theory, Assumptions, Grid system, Determination of the initial arrays, The finite difference potential equation, Permeability and reluctance calculations, Boundary conditions, The acceleration of convergence, Calculation of the air gap flux, Motor data and specifications, The computer program, Results, Tables.
AD-646 370 HC$3.00 MF$0.65

GENERAL CONCEPT FOR AN ELECTRIC MOTOR REPAIR PROGRAM FOR THE FLEET.
Navy Marine Engineering Lab Annapolis Md
For primary bibliographic entry see Field 13J.
A D-652 796 HC$3.00 MF$0.65

ELECTRON SYNCHRONOUS WAVE AMPLIFIER,
Utah Univ Salt Lake City Microwave Device and Physical Electronics Lab
For primary bibliographic entry see Field 9E.
AD-653 009 HC$3.00 MF$0.65

ELECTRON BEAM STABILITY IN CYCLOTRON-SYNCHRONOUS WAVE AMPLIFIERS,
Utah Univ Salt Lake City Microwave Device and Physical Electronics Lab
For primary bibliographic entry see Field 9E.
AD-653 010 HC$3.00 MF$0.65

CYCLOTRON WAVE DEVICES STUDY.
Utah Univ Salt Lake City Microwave Device and Physical Electronics Lab
For primary bibliographic entry see Field 9E.
AD-653 011 HC$3.00 MF$0.65

RADIATION DAMAGE IN SOLIDS: COMPILATION OF ABSTRACTS,
Library of Congress Washington D C Aerospace Technology Div
For primary bibliographic entry see Field 18H.
AD-653 185 HC$3.00 MF$0.65

A HILLCLIMBING TECHNIQUE USING PIECEWISE CUBIC APPROXIMATION,
Purdue Univ Lafayette Ind School of Electrical Engineering
J. C. Hill. Apr 64, 119p Rept no. TR-EE64-7
AFOSR-67-1282
Grant AF-AFOSR-351-62

Descriptors: (*Systems engineering, Control systems), (*Electrical engineering, *Operations research), Polynomials, Mathematical models, Performance (Engineering), Measuring devices (Electrical + Electronic), Approximation (Mathematics), Reliability (Electronics), Experimental data, Convergence, Sampling, Computer programs, Optimization, Errors, Noise.
Identifiers: Hillclimbing.

Three distinct types of hillclimbing techniques are studied in this thesis. The first is variations of the conventional discrete search as proposed by Bocharov and Fel'dbaum. The second is Kushner's method. The third is the piecewise cubic method, which is developed herein. The last two methods operate by building a model from the measurements obtained. The concept of testing various hillclimbing methods on a relatively large number of randomly selected hills is proposed. A class of such hills is presented, the members of which are capable of exhibiting most of the troublesome features of practical hills. This concept is then applied to evaluate the performance of the three types of hillclimber with respect to five criteria: (1) Average minimal hill height; (2) Average number of measurements; (3) Average integral of the Index of Performance; (4) Reliability; and (5) Noise sensitivity. With regard to these criteria, experimental evidence via digital simulation is presented for the superiority of the two model building techniques over the Bocharov and Fel'dbaum methods. The piecewise cubic method is extended to two dimensions and a limited amount of experimental data is presented on its performance compared to the Bocharov and Fel'dbaum methods.
AD-653 215 HC$3.00 MF$0.65

CONSTANT RESISTANCE ONE-PORTS WHICH INCLUDE NONLINEAR TIME-VARYING ELEMENTS,
California Univ Berkeley Dept of Electrical Engineering
For primary bibliographic entry see Field 9A.
AD-653 222 Not available from CFSTI.

SELF-DUALITY AND CONSTANT RESISTANCE ONE-PORTS,
California Univ Berkeley Dept of Electrical Engineering
For primary bibliographic entry see Field 9E.
AD-653 225 Not available from CFSTI.

AUTOMATIC TUNING OF HYDROGEN MASERS,
Army Electronics Command Fort Monmouth NJ Electronic Components Lab
For primary bibliographic entry see Field 20E.
AD-653 343 Not available from CFSTI.

SOLID STATE ELECTRONIC CIRCUITS FOR THE LINE RECORDER MASS SPECTROMETER,
Oak Ridge Gaseous Diffusion Plant, Tenn.
For primary bibliographic entry see Field 18D.
For abstract, see NSA 21 12.
K-1692 HC$3.00 MF$0.65

RESEARCH LABORATORY OF ELECTRONICS QUARTERLY PROGRESS REPORT, PERIOD ENDING 28 FEB. 1967.
Massachusetts Inst. of Tech., Cambridge. Research Lab. of Electronics.

15 Apr 67, 369p NASA-CR-84300, QPR-85
Contract NSR-22-009-120, Grant NSG-496

Descriptors: *Communication system, *Computer programming, *Engineering, Communication, Dynamics, Electronic equipment, Language, Lattice vibration, Mass spectrometer, Physics, Plasma, Plasma dynamics, Plasma physics, System.

For abstract, see STAR 05 14.
N67-27081 HC$3.00 MF$0.65

STABILITY OF ATTITUDE CONTROL SYSTEMS ACTED UPON BY RANDOM PERTURBATIONS.
General Precision, Inc., Little Falls, N. J.
V. Cohen, J. Ellis, B. Friedland, P. E. Sarachik, and F. E. Thau. May 67, 136p NASA-CR-731
Contract NAS12-48

Descriptors: *Attitude control, *Mathematical model, *Perturbation, *Random prccess, Attitude, Computer, Confinement, Control, Impulse, Markov process, Mathematics, Model, Monte carlo method, Poisson process, Probability, Process, Random, Simulation, Stability.

For abstract, see STAR 05 14.
N67-27619 HC$3.00 MF$0.65

VARIABLE TIME OPTIMAL CONTROL.
California Univ., Los Angeles. Dept. of Engineering.
R. A. Niemann. Apr 67, 104p NASA-CR-84510, REPT.-66-633
Grant NSG-237-62

Descriptors: *Algorithm, *Numerical analysis, *Time optimal control, Analysis, Computation, Control, Fixed, Numerical, Optimal, Optimization, Pontryagin principle, Problem, Quasi-linear, Sequence, Solution, Technique, Time, Variable.

For abstract, see STAR 05 14.
N67-27670 HC$3.00 MF$0.65

OPTIMAL CONTROL OF DISTRIBUTED PARAMETER SYSTEMS USING MULTILEVEL TECHNIQUES.
California Univ., Los Angeles. Dept. of Engineering.

Group 9C—Electronic and electrical engineering

D. A. Wismer, Jr.. Apr 67, 131p NASA-CR-84511, REPT.-66-55C
Grant NSG-237-62

Descriptors: *Approximation method, *Numerical analysis, *Optimal control, *Partial differential equation, Analysis, Approximation, Boundary, Computer, Control, Decomposition, Differential, Discretization, Equation, Level, Method, Multiple, Numerical, Optimal, Parameter, Partial, Problem, Program, Quasi-linear, Spatial, System, Technique.

For abstract, see STAR 05 14.
N67-27671 HC$3.00 MF$0.65

SELMA PROGRAMMER'S REFERENCE MANUAL.
Technische Hochschule Stuttgart (West Germany).
K. E. Buck. Dec 65, 76p REPT.-26

Descriptors: *Code, *Manual, *Matrix, Computer, Data, Instruction, Method, Program.
For abstract, see STAR 05 14.
N67-27699 HC$3.00 MF$0.65

AN AUTOMATIC SYSTEM FOR THE ANALYSIS OF TIME VARIANT DATA.
Technical rept.,
Institute for Telecommunication Sciences and Aeronomy, Boulder, Colo.
Paul I. Wells, and Donald V. Glen. Sep 66, 88p
ITSA-9
IER-9

Descriptors: (*Troposphere, Radio waves), (*Radio waves, Interference), Time-interval counters, Distributed amplifiers, Radio signals, Computers, Attenuation, Recording systems, Magnetic tape, Commutators, Rotary switches, Automatic, Voltage.

The efforts of the Tropospheric Telecommunications Laboratory of the Environmental Science Services Administration are devoted principally to the study of the behavior of the troposphere, the behavior of radio waves in the troposphere and the study of the interference environment. The output of instruments measuring these phenomena is normally a slowly varying d-c voltage which is recorded on magnetic tape. Equipment has been developed to analyze these data for certain of their amplitude characteristics. These are: (a) comulative amplitude distribution, (b) fade rate versus level, (c) fade duration distribution at specific data levels, and (d) a distribution of the percent of time preset fade durations are exceeded.
PB-173 593 HC$3.00 MF$0.65

OSCILLOSCOPE PREAMPLIFIER TYPE B OR 53/54B (TEKTRONIX).
Technical manual instrument calibration procedure VA-08.
Bureau of Naval Weapons Representative, Pomona, Calif. Metrology Engineering Center.
1 May 67, 15p
NAVAIR-17-20VA-08

Descriptors: (*Preamplifiers, *Calibration), (*Oscilloscopes, Preamplifiers), Test equipment (Electronics), Test methods.

This procedure describes the calibration of the Tektronix type B or 53/54B preamplifier.
PB-174 798 HC$3.00 MF$0.65

POWER OSCILLATOR MICRODOT 408, 408 B.
Technical manual instrument calibration procedure, AG-111.
Bureau of Naval Weapons Representative, Pomona, Calif. Meteorology Engineering Center.
15 Apr 67, 14p
NAVAIR-17-20AG-111

Descriptors: (*Calibration, *Oscillators), Instruction manuals, Test equipment (Electronics), Test methods, Power.

The procedure describes the calibration of the Microdot 408 or 408-B power oscillator. (Author)
PB-174 830 HC$3.00 MF$0.65

ALTITUDE CONTROLLER TESTER, PART NO. VPT-10G-11414A, VPT-10G-11414B, VPT-10E-12510, VPT-10G-12510A, AND VPT-10G-12510B.
Instrument calibration procedure manual.
Naval Air Systems Command, Washington, D.C.
15 Feb 67, 26p NAVAIR-17-20QT-07
Supersedes PB-169 051, NAVAIR-17-20QT-07, dated 15 Oct 65.

Descriptors: (*Calibration, *Test sets), Instruction manuals, Test equipment (Electronics), Test methods, Altitude.

The manual contains calibration instructions for Altitude Controller Tester, PN VPT-10G-11414A and VPT-10G-11414B. Also included are a list of calibration equipment required, and instructions for corrective action and for evaluating and recording data. (Author)
PB-174 831 HC$3.00 MF$0.65

CABIN TEMPERATURE CONTROL SYSTEM TEST SET, PART NO. 70000143 FEDERAL STOCK NO. (TELEDYNE CONTROL SYSTEMS).
Technical manual test equipment calibration procedures.
Naval Air Systems Command, Washington, D.C.
1 Feb 67, 21p NAVAIR-17-20QAA-1

Descriptors: (*Calibration, *Test sets), Instruction manuals, Test equipment (Electronics), Test methods, Temperature control, Aircraft.

The publication consists of procedures for calibrating the Cabin Temperature Control System Test Set. It is designed to test components of the cabin and flight station temperature control systems used on P-3 aircraft. All the necessary interconnecting cables are contained in a shelf accessible through the top lid of the Test Instrument case. (Author)
PB-174 832 HC$3.00 MF$0.65

OSCILLOSCOPE PREAMPLIFIER, TYPE D OR 53/54D (TEKTRONIX).
Technical manual instrument calibration procedure, VA-10.
Bureau of Naval Weapons Representative, Pomona, Calif. Meteorology Engineering Center.
1 May 67, 20p
NAVAIR-17-20VA-10

Descriptors: (*Calibration, *Preamplifiers), Instruction manuals, Test equipment (Electronics), Test methods, Oscilloscopes.

The procedure describes the calibration of the Tektronix type D or 53/54D preamplifier. (Author)
PB-174 833 HC$3.00 MF$0.65

RANDOM-NOISE GENERATOR GENERAL RADIO 1390-B.
Technical manual instrument calibration procedure AG-100.
Bureau of Naval Weapons Representative, Pomona, Calif. Metrology Engineering Center.
1 May 67, 14p
NAVAIR-17-20AG-100

Descriptors: (*Calibration, *Generators), Instruction manuals, Test equipment (Electronics), Test methods, Noise (Radio).

The procedure describes the calibration of the General Radio 1390-B random-noise generator. (Author)
PB-174 851 HC$3.00 MF$0.65

FIXED COAXIAL ATTENUATORS 0 TO 50DB 0.2 TO 10.0 GHz.
Technical manual instrument calibration procedure GA-05.
Bureau of Naval Weapons Representative, Pomona, Calif. Metrology Engineering Center.
1 May 67, 82p
NAVAIR-17-20GA-05
Supersedes PB-170 987.

Descriptors: (*Calibration, *Attenuators), Instruction manuals, Test equipment (Electronics), Test methods.

The procedure describes the calibration of coaxial attenuators of values between 0 to 50 db at frequencies of 0.2 to 10 GHz, a partial list of which is given in appendix A. (Author)
PB-174 853 HC$3.00 MF$0.65

ENGINE-ROTOR SYSTEM TEST SET AN/USM-202. PART NO. Y63-315880-481-1, PART NO. Y63E880045-001.
Instrument calibration procedure manual.
Naval Air Systems Command, Washington, D.C.
15 Feb 67, 28p NAVAIR-17-20QT-08
Supersedes PB-169 052.

Descriptors: (*Calibration, *Test sets), Instruction manuals, Test equipment (Electronics), Test methods, Portable, Generators, Tachometers.

The Engine-Rotor System Test Set AN/USM-202, PN Y63-315880-481-1, is a portable line maintenance tester which provides test and monitoring functions necessary to test the operation of Navy Model QH-50C Drone engine-rotor system. The test instrument consists of five panels, two tachometer-generators, four temperature probes, and the interconnecting cable assemblies. (Author)
PB-174 854 HC$3.00 MF$0.65

AUDIO OSCILLATOR WAVEFORMS 401H.
Technical manual instrument calibration procedure AG-107.
Bureau of Naval Weapons Representative., Pomona, Calif. Metrology Engineering Center.
15 Apr 67, 14p
NAVAIR-17-20AG-107

Descriptors: (*Calibration, *Oscillators), Instruction manuals, Test equipment (Electronics), Test methods.

The procedure describes the calibration of the Waveforms 401H audio oscillator. (Author)
PB-174 855 HC$3.00 MF$0.65

OSCILLOSCOPE PREAMPLIFIER TYPE H OR 53/54H (TEKTRONIX).
Technical manual instrument calibration procedure VA-11.
Bureau of Naval Weapons Representative, Pomona, Calif. Metrology Engineering Center.
1 May 67, 15p
NAVAIR-17-20VA-11

Descriptors: (*Calibration, *Preamplifiers), Instruction manuals, Test equipment (Electronics), Test methods.

The procedure describes the calibration of the Tektronix type H or 53/54H preamplifier. (Author)
PB-174 856 HC$3.00 MF$0.65

IMPEDANCE BRIDGE GENERAL RADIO 650-A, OJ-1, OJ-2, AND OJ-3.
Technical manual instrument calibration procedure. AZ-09.
Bureau of Naval Weapons Representative, Pomona, Calif. Meteorology Engineering Center.
1 May 67, 14p
NAVAIR-17-20AZ-09
Supersedes PB-181 652.

Descriptors: (*Calibration, *Impedance bridges), Instruction manuals, Test equipment (Electronics), Test methods.

The procedure describes the calibration of the OJ-1, OJ-2, OJ-3, and the General Radio 650-A impedance bridges. (Author)
PB-174 858 HC$3.00 MF$0.65

9D. INFORMATION THEORY

LOCAL BEHAVIOR OF STATIONARY GAUSSIAN PROCESSES.
RAND Corp., Santa Monica, Calif.
For primary bibliographic entry see Field 12A.
AD-641 323 HC$3.00 MF$0.75

HIGH SPEED DIGITAL FILTERING BY CONVOLUTION APPROXIMATION.
Aerospace Medical Research Labs Wright-Patterson AFB Ohio
For primary bibliographic entry see Field 9B.
AD-652 856 HC$3.00 MF$0.65

PICTURE CODING.
Massachusetts Inst of Tech Cambridge Research Lab of Electronics
For primary bibliographic entry see Field 17B.
AD-652 906 Not available from CFSTI.

SPACE-TIME CORRELATION THEORY FOR INFORMATION-CARRYING SIGNALS.
Revised ed.,
Hughes Aircraft Co Culver City Calif Aerospace Group
G. O. Young, and A. A. Ksienski. 22 Aug 66, 13p
Rept no. Scientific-4, P67-102
AFCRL-67-0311
Contract AF 19 (628)-4358
Revision of manuscript submitted 20 Jun 1966. See also AD-648 079.
Availability: Published in IEEE Transactions on Antennas and Propagation, vAP-15 n1 p163-71, 1 Jan 1967.

Descriptors: (*Radar signals, *Signal-to-noise ratio), (*Correlation techniques, Optimization), Communication systems, Radar antennas, Electromagnetic fields, Noise (Radar), Electromagnetic fields, Systems engineering, Engineering personnel, Random variables, Fourier analysis, Series, Statistical functions, Information theory.

A theory is presented for the analysis and optimization of systems which process electromagnetic fields carrying information. The theory is thus intended for use primarily by communications and radar engineers. The definitions are motivated by a fundamental requirement that the input-output space-time mutual information transfer be a maximum. The theory can be applied to problems involving nonstationary and nonergodic processes in space and time. The technique proposed is particularly useful in the analyses and optimization of controlled systems carrying man-made information, such as radar and communications. System optimization is carried out by maximization of the transcorrelation function with respect to the variable parameters of the system. The transcorrelation function is a space- and time-averaged correlation function between the desired and the actual system outputs. The optimization technique is applied to the problem of an antenna embedded in a nonstationary medium, such as a hot plasma. The amplitude and phase shading of the array are the variable parameters chosen for optimization of the system, and medium effects, background (object) noise, receiver noise, etc., are considered.
AD-653 124 Not available from CFSTI.

ISN'T MY PROCESS TOO VARIABLE FOR EVOP.
Wisconsin Univ Madison Dept of Statistics
For primary bibliographic entry see Field 12B.
AD-653 266 HC$3.00 MF$0.65

HUMAN INFORMATION TRANSMISSION WITH DIFFERENT ENCODING PROCEDURES FOR BINARY STIMULI,
General Dynamics Corp Groton Conn Electric Boat Div
For primary bibliographic entry see Field 5J.
AD-653 277 HC$3.00 MF$0.65

A LOWER BOUND FOR DISCRIMINATION INFORMATION IN TERMS OF VARIATION,
George Washington Univ Washington D C Dept of Statistics
Solomon Kullback. 23 Mar 66, 3p
AFOSR-67-1250
Grant AF-AFOSR-932-65
Availability: Published in IEEE Transactions on Information Theory vIT-13 n1 p126-7 Jan 1967.

Descriptors: (*Information theory, Functions), (*Measure theory, Algebra), Inequalities, Set theory.

A lower bound is given for the discrimination information of the probability measures P1 and P2 in terms of the variation of P1 and P2. This bound is larger than previously published bounds.
A D-653 306 Not available from CFSTI.

LINEAR OPTIMUM PREDICTORS.
Revised ed.,
Johns Hopkins Univ Baltimore Md
Stephen S. Wolff, Joseph L. Gastwirth, and John B. Thomas. 17 May 66, 4p
Contracts Nonr-4010 (13), Nonr-4010 (09)
Revision of manuscript submitted 21 Feb 66.
Availability: Published in IEEE Transactions on Information Theory vIT-13 n1 p30-2 Jan 1967.

Descriptors: (*Statistical processes, *Random variables), (*Information theory, Statistical processes), Distribution theory, Least squares method, Special functions (Mathematical), Theorems, Errors.

The least mean square error predictor is shown to be linear for a class of processes that are generated by passing independent white noise through a minimum-phase linear filter. Many random processes generated in this way are non-Gaussian. (Author)
AD-653 377 Not available from CFSTI.

9E. SUBSYSTEMS

LOW-FREQUENCY AIRBORNE ANTENNA SYSTEM.
Final rept., 1 May-30 Jul 64,
Airtechnology Corp., Cambridge, Mass.
James C. Maxwell. 30 Aug 64, 59p Rept. no. 1
Contract DA-02-086-AMC-0051 (E)

Descriptors: (*Omnidirectional antennas, Aircraft antennas), Army aircraft, Low frequency, Airborne, Communication equipment, Radio navigation, Helicopters, Army equipment, Noise (Radio), Polarization, Sensitivity, Helicopter rotors, Electric discharges, Loop antennas, Preamplifiers, Aerodynamic characteristics, Radio receivers, Atmospheric electricity, Radio reception, Distribution.
Identifiers: O-1 Aircraft, H-13 Aircraft, V-6 Aircraft, OV-1 Aircraft, H-34 Aircraft, V-2 Aircraft, Tailcap antennas, Whip antennas.

Efforts concern a study program to determine the optimum design and the fabrication requirements for a low frequency airborne antenna system. The system will be capable of operating in the frequency range from 30 to 300 KCS and will be used with airborne communication and navigational receiving equipments on a multiple or time-sharing basis. Various antenna systems were analyzed and evaluated in terms of specific design goals for a low-frequency navigation communication receiving antenna system for use on several types of U.S. Army aircraft, both fixed-wing and rotary. In addition to the design goalr, the antenna systems were considered in relation to three specific factors-susceptibility to electrical noise environment, antenna polarization, and sensitivity. The effects of helicopter rotor-modulation on the antennas were studied. The preliminary engineering design of an airborne, omni-directional, 30-300 kc whip antenna with preamplifier, designed to obtain optimum electrical and aerodynamic performance, was completed. (Author)
AD-458 148 HC$3.00

NETWORK GROUP, HYBRID CIRCUIT OA-7424 (XW-1)/FCC-17.
Final technical rept. on phase A,
Lenkurt Electric Co., Inc., San Carlos, Calif.
Thomas F. Curry, and C. Dean Charrier. 30 Oct 64, 28p
RADC-TDR-63-529-Vol-1
Contract AF 30 (635)-11188

Descriptors: (*Networks, *Circuits), Design, Frequency, Channel selectors, Electric wire, Theory.

The Phase A Technical Report contains a summary of design and development problems and a theoretical discussion of the Network Group, Hybrid Circuit, which was designed and developed to provide two-wire termination for 12 four-wire voice frequency circuits. Transhybrid balance, is accomplished either by strapping-in an internal compromise balancing network or by utilizing an external precision balancing network. Mechanically, the shelf is unique in the fact that it is mounted in an upside-down position with respect to the conventional mounting of AN/FCC-17 shelves. The predicted Mean Time Between Failure of two Network Group, Hybrid Circuits (24 channels) is 5820 hours with a Point Availability of 99.995 percent. (Author)
AD-461 670 HC$3.00

IBM 704 COMPUTER CIRCUIT ANALYSIS PROGRAM NO. 0400,
Navy Underwater Sound Lab., New London, Conn.
Henry Weinberg. 1 Nov 66, 38p USL-751

Descriptors: (*Programming (Computers), Circuits), (*Circuits, Analysis), Electrical networks, Polynomials, Equations, Programming languages.
Identifiers: IBM 704, FORTRAN, SAP.

The Circuit Analysis Program was prepared for the IBM 704 computer and is written in the FORTRAN and SAP-FORTRAN languages. In this report, the program is used to analyze R-L-C (resistance, inductance, and capacitance) electric networks and, once the proper analogies are made, resolve problems relative to obtaining eigenvalues and roots of polynomials and solving systems of general linear equations. Examples of some of the above problems are provided. The total number of equations for each problem cannot exceed 30. Accuracy of the solution is improved by using two 36 binary bit words to represent each number, but

execution time is sacrificed. The requestor controls the format used to read the equation parameters; thereby, the flexibility of the program is increased, and the possibility of transcribing errors is reduced. Three methods for evaluating a determinant with quadratic elements were tried, and it was decided that the method of 'false position' is the most effective because of its advantageous storage and time requirements and greater accuracy. (Author)
AD-644 203 HC$3.00 MF$0.65

LOW COST INTEGRATED CIRCUIT TECHNIQUES.
Final rept. no. 5, 15 Jun 65-14 Sep 66,
Philco-Ford Corp Lansdale Pa Microelectronics Div
Sturger Wagner, and Walter L. Doelp, Jr. May 67, 101p
ECOM-01424-F
Contract DA-28-043-AMC-01424 (E)

Descriptors: (*Integrated circuits, *Costs), Glass, Coatings, Silicon, Circuits, Microminiaturization (Electronics), Vapor plating, Environmental tests, Moisture, Tables, Epoxy plastics, Effectiveness, Soldering, Bonding, Design, Modules (Electronics), Assembling, Corrosion.

An over-all process was developed for glass coating of silicon integrated circuit chips and batch attaching them to an appropriately processed substrate. The techniques developed were demonstrated by delivery of four 10-chip arrays consisting of glassed silicon micro-circuits flip-chip assembled on a plug-in printed circuit board. Detailed information is provided concerning wafer glassing and other processing leading to flip-chip assembly. In addition to the delivery of the final exploratory development models, other development units were fabricated and subjected to a test sequence intended to demonstrate the effectiveness of the developed process. Although the assignment of a quantitative failure rate was considered unrealistic because of the limited sample size, the analysis of the test data led to the conclusion that no catastrophic or major deleterious effects result from the combined glass and batch assembly process. (Author)
AD-652 699 HC$3.00 MF$0.65

GENERATING FUNCTIONS WITH INTEGRATORS,
Harry Diamond Labs Washington D C
Arthur Hausner. Mar 67, 53p Rept no. HDL-TR-1341

Descriptors: (*Nonlinear programming, *Analog computers), (*Frequency multipliers, *Oscillators), Differential equations, Errors, Graphics, Problem solving, Accuracy, Functions, Theorems, Effectiveness, Gain, Feedback, Polynomials, Integrated circuits.

Generalized integration is a technique for generating explicit functions on an analog computer by solving the appropriate differential equations. The parametric technique is recommended for setting up the solutions. The summation and linear equipment theorems are shown to extend the use of linear equipment. Many examples illustrating the usefulness of these techniques are described, including generation of high degree oscillatory polynomials. A discussion on the use of multipliers contains a description of a technique for rational function generation. Track-and-store methods are also discussed. An important theorem concerning the use of linear equipment in this method is proved, with an example to show its effectiveness. The major advantage of these techniques is achievement in some cases of great accuracy with minimum equipment. The major disadvantage is that, with time, errors may sometimes increase and may not be bounded.
AD-652 729 HC$3.00 MF$0.65

GAIN AND PATTERN MEASUREMENTS OF LARGE ASPECT RATIO REFLECTORS.
Memorandum rept.,
Naval Research Lab Washington D C
H. P. Coleman, and B. D. Wright. Jul 65, 18p Rept no. NRL-MR-1633

Descriptors: (*Reflectors, Antennas), Gain, Antenna radiation patterns, Measurement, Antenna feeds, Parabolic antennas, Slot antennas, Antenna arrays.

The report summarizes the results of absolute gain and radiation pattern measurements on two large aspect ratio reflectors with various primary feed systems. The width-to-height ratios of the reflectors approximated 7.2 to 1 and the focal lengths were approximately one-quarter of the large dimension. The antennas were polarized with the primary feed E-field parallel to the large dimension of the reflectors. (Author)
AD-652 795 HC$3.00 MF$0.65

FILTER BANDWIDTH STUDY OF AN AFC SYSTEM.
Master's thesis,
Texas Univ Austin Defense Research Lab
William Lewis Davidson. Jan 61, 61p Rept no. DRL-460
Contract NOrd-16498
Prepared in cooperation with Johns Hopkins Univ., Silver Spring, Md. Applied Physics Lab., CF-2909.

Descriptors: (*Automatic frequency control, *Band-pass filters), Theses, Bandwidth, Signal-to-noise ratio, Continuous wave radar, Radar reflections, Tracking, Frequency, Doppler systems.

Frequency rate, signal-to-noise ratio, and amplitude fluctuations--these three parameters of the reference input to a type 1, difference-frequency, AFC frequency tracking loop--cause some difficulty in choosing the tracking loop filter bandwidth. A study was made of the frequency tracking ability of a particular AFC system for various filter bandwidths. The doppler frequency of the CW radar echo from a four-motored propeller-driven aircraft is the ultimate reference input the system is required to follow. (Author)
AD-652 800 HC$3.00 MF$0.65

SCATTERING CROSS SECTIONS OF MICROWAVE ANTENNAS.
Texas Univ Austin Defense Research Lab
For primary bibliographic entry see Field 17I.
AD-652 803 HC$3.00 MF$0.65

COMPOSITE THERMOPLASTIC/GLASS FILAMENT REINFORCEMENT FOR BUOYANT SUBMARINE CABLES RG-372 (XN-1)/U AND RG-373 (XN-1)/U.
Union Carbide Corp Bound Brook N J Research and Development Dept
For primary bibliographic entry see Field 11D.
AD-652 810 HC$3.00 MF$0.65

SOME CURRENT DISTRIBUTIONS FOR SLOT ARRAYS ON THE CIRCUMFERENCE OF A CYLINDER,
Harry Diamond Labs Washington D C
Harry K. Morlock. Feb 67, 15p Rept no. HDL-TM-67-1

Descriptors: (*Slot antennas, Antenna arrays), Cylindrical bodies, Antenna radiation patterns, Distribution.

Current distributions are calculated which when used to feed an array of slots on the circumference of a 9-ft diameter cylinder produce one main beam with all other lobes suppressed more than 20 db. Patterns are calculated for 10-, 20-, 30-, and 40-element arrays. Half- and tenth-power beam widths are tabulated for each array. (Author)
AD-652 875 HC$3.00 MF$0.65

THIN-FILM POLYCRYSTALLINE FIELD-EFFECT TRIODE.
Radio Corp of America Somerville N J Defense Microelectronics
For primary bibliographic entry see Field 9A.
AD-652 885 HC$3.00 MF$0.65

LOW COST CAPTURE EFFECT GLIDE SLOPE AMPLITUDE AND PHASE CONTROL UNIT.
Micro-Radionics Inc Van Nuys Calif
For primary bibliographic entry see Field 17G.
AD-652 939 HC$3.00 MF$0.65

BOUNDARY-VALUE PROBLEMS ASSOCIATED WITH SOURCE-EXCITED PLANAR-EQUIANGULAR-SPIRAL ANTENNAS.
Revised ed.,
Illinois Univ Urbana Antenna Lab
S. R. Laxpati, and R. Mittra. 28 Nov 66, 12p
AROD-5405:5
Grant DA-ARO (D)-31-124-G646
Revision of manuscript submitted 12 Sep 66.
Proc. IEE. v114 n3 p352-61 Mar 1967.

Descriptors: (*Spiral antennas, *Boundary value problems), Antenna radiation patterns, Excitation, Electric currents, Density.

Several boundary-value problems associated with the planar-spiml geometry are considered. A source-excited-sheath problem is formulated exactly, and a formal solution in terms of Hankel's inverse transform is presented. The approximate form of the current density on the sheath structure is obtained. A push-pull-excited 2-arm thin-wire antenna is discussed next. It is found that the approximate current-density solution is closely related to that of the corresponding sheath version. The approximate form of the current density is found to exhibit a slow-wave character along the radial dimension. Some far-field patterns are computed by the vector-potential method. The results of the current densities and the radiation patterns are found to be in favourable agreement with the experimental results. A short discussion on the solution of a multiarm antenna is also given. The approximate current density and the far-field patterns are also computed for a 4-arm antenna. Some general conclusions are presented. (Author)
AD-652 952 Not available from CFSTI

A STUDY OF THE SHEATH HELIX WITH A CONDUCTING CORE AND ITS APPLICATION TO THE HELICAL ANTENNA.
Revised ed.,
Illinois Univ Urbana Antenna Lab
A. R. Neureuther, P. W. Klock, and R. Mittra. 1 Aug 66, 11p
AROD-5405:4
Grant DA-ARO (D)-31-124-G646
Revision of manuscript submitted 14 Mar 66. Supported in part by NSF.
Availability: Published in IEEE Transactions on Antennas and Propagation vAP15 n2 p203-10 Mar 1967

Descriptors: (*Helical antennas, Helixes), Determinants, Numerical methods and procedures, Antenna radiation patterns, Configuration.

A theoretical study of the sheath helix antenna with a conducting core is made via the complex solutions of an associated determinantal equation. The variation of the characteristics of operation with respect to core size and pitch angle is established. A comparison of the complex solutions for the sheath helix and tape helix indicates that a good understanding of the helical antenna can be gained from the sheath model. In particular, explaining broadside radiation in terms of complex

solutions is shown to give results in agreement with previously reported empirical data. However, this comparison also points out the limitations of the sheath model in predicting the operational parameters accurately. (Author)
AD-652 953 Not available from CFSTI.

ELECTRON SYNCHRONOUS WAVE AMPLIFIER,
Utah Univ Salt Lake City Microwave Device and Physical Electronics Lab
Tai-Wu Kao, and C. C. Johnson. Dec 66, 135p
Rept no. MD-66-023
ECOM-02372-1
Contract DA-36-039-AMC-02372 (E)

Descriptors: (*Microwave amplifiers, Analysis), (*Electron beams, Microwave amplifiers), Parametric amplifiers, Cyclotron waves, Space charges, Direct current, Pumping (Electronics), Electron optics, Polarization.
Identifiers: Coupling (Electromagnetic), Cyclotron-synchronous wave amplifiers.

The cyclotron-synchronous wave electron beam microwave amplifier is investigated. Coupling of the electron beam waves by the d-c space-charge forces and the spatially-varying d-c pump fields is examined, subject to the beam focusing conditions. The small signal assumption is made, and polarization variables are used to analyze the wave behavior in coupled-mode form for both the rotating and nonrotating electron beam cases. Force-free modes and transverse modes are obtained by solving the force equation. Nonlinear variation of the electrostatic pump field in the ring-type pump structure is considered. The gain of the cyclotron-synchronous coupling mechanism and the kinetic power density carried by the beam modes are not uniform across the beam cross section, as indicated in the filamentary beam analysis. The variations are significant only for a thick beam. Analysis shows that at omega = (omega sub c), the Cuccia cavity couples to the tranrverse modes strongly, but no coupling to the force-free waves is possible. Experimental results of the amplifier with Cuccia cavities as the coupling elements are included. (Author)
AD-653 009 HC$3.00 MF$0.65

ELECTRON BEAM STABILITY IN CYCLOTRON-SYNCHRONOUS WAVE AMPLIFIERS,
Utah Univ Salt Lake City Microwave Device and Physical Electronics Lab
M. T. Ahlquist, C. C. Johnson, and K. I. Talbot.
Dec 66, 37p Rept no. MD-66-024
ECOM-02372-2
Contract DA-36-039-AMC-02372 (E)

Descriptors: (*Microwave amplifiers, Stability), (*Electron beams, Microwave amplifiers), Pumping (Electronics), Space charges, Computer programs, Cyclotron waves, Electron optics.
Identifiers: Cyclotron-synchronous wave amplifiers.

Experiments with the cyclotron-synchronous wave microwave amplifier (see AD-652 009) have encountered difficulties, in some cases, due to beam blow-up in the low pump voltage-low space charge regime. A computer-assisted theoretical investigation of the problem was undertaken and the results are reported.
AD-653 010 HC$3.00 MF$0.65

CYCLOTRON WAVE DEVICES STUDY.
Quarterly rept. no. 8,
Utah Univ Salt Lake City Microwave Device and Physical Electronics Lab
T. Kao, D. C. Watson, K. I. Talbot, C. H. Durney, and C. C. Johnson. Dec 66, 39p Rept no. MD-66-025
ECOM-02372-3
Contract DA-36-039-AMC-02372 (E)

Descriptors: (*Microwave amplifiers, *Cyclotron waves), (*Electron beams, Microwave amplifiers), Space charges, Direct current, Alternating current, Microwave equipment, Gain, Electron optics, Transmission lines, Stability, Electron guns, Radiofrequency power, Parametric amplifiers.
Identifiers: Cyclotron-synchronous wave amplifiers, Coupling (Electromagnetic), Power converters.

An analysis of 'force-free' mode coupling in the Cuccia coupler is carried out to supplement the transverse mode coupling analysis. The complete analytical and experimental results on the cyclotron-synchronous wave amplifier are available in AD-653 009. A computer analysis of the power converter was carried out which includes space-charge and finite beam size effects. These calculations give results not too different than the filamentary beam results. Using the same space-charge beam model as that used in the power converter analysis, a beam stability computer calculation was carried out for the amplifier. The results are somewhat different than the published curves of Sackinger and Buck, and Bass. (Author)
AD-653 011 HC$3.00 MF$0.65

OSCILLATORS, MODULATORS, AND MIXERS SUITABLE FOR INTEGRATED CIRCUIT REALIZATION,
Stanford Univ Calif Stanford Electronics Labs
B. D. Anderson, W. New, and R. W. Newcomb.
19 Dec 66, 4p
AFOSR-67-1178
Grant AF-AFOSR-337-63
Prepared in cooperation with Newcastle Univ. (Australia), and Duke University Medical School, Durham, N. C.
Availability: Published in Proceedings of the IEEE v55 n3 p438-9 Mar 1967.

Descriptors: (*Integrated circuits, Microwave networks), Oscillators, Modulators, Mixers (Electronics), Timing circuits, Electrical networks, Subminiature electrical equipment, Networks, Transistors, Capacitors.
Identifiers: Gyrators.

It is shown how the variable grounded gyrators now becoming available in integrated-circuit form can be used in conjunction with transistors and capacitors to obtain oscillators, modulators, and mixers. (Author)
AD-653 056 Not available from CFSTI.

PAPERS ON INTEGRATED CIRCUIT SYNTHESIS.
Technical rept.,
Stanford Univ Calif Stanford Electronics Labs
R. W. Newcomb, and T. N. Rao. Jun 66, 214p
Rept no. SEL-66-058, SEL-TR-6560-4
Contract Nonr-225 (83)

Descriptors: (*Integrated circuits, *Synthesis), Amplifiers, Functions, Inductance, Electrical engineering, Operation, High frequency, Reports, Networks, Electrical impedance, Circuits, Linear systems, Electric filters, Voltage, Stability, Electrical conductance, Mathematical analysis, Tables, Ultrasonic properties, Design.

The ten papers that constitute this report were presented as term papers by graduate students at Stanford University for the electrical engineering course EE 292Y, 'Active Integrated Network Synthesis,' Spring Quarter, 1966. The majority of papers contain original results. The topics covered, by chapter, are: Linear Models for Monolithic Integrated Circuits; Simulation of Inductance Characteristics in Integrated Circuits; Gyrators and Their Application to Second-Order Transfer Functions; An Integrable Direct-Coupled Gyrator; A Gyrator Realization Using Operational Amplifiers; High-Frequency Tuning and Filtering in Integrated Circuits; RC Synthesis with Differential-Input Operational Amplifiers; Synthesis of Distributed RC Networks; RC Active Networks; Substitution of Inductances in Integrated Circuits. (Author)
AD-653 096 HC$3.00 MF$0.65

ANTENNA UNIT AND SIGNAL SPECTRUM ANALYZER.
Final engineering rept.,
Ford Instrument Co Long Island City N Y
S. N. Smilowitz. Oct 66, 99p
USNRDL-TRC-67-17
Contract N228 (62479)65682

Descriptors: (*Antennas, *Preamplifiers), (*Spectrum analyzers, *Signals), Design, Feasibility studies, Diagrams, Electromagnetic properties, Frequency, Gain, Detectors, Comparators, Antenna components.

The report presents a detailed description of the design and test evaluation of a breadboard system capable of detecting transient electromagnetic signals and determining the dominant spectral frequencies of these signals. The equipment is designed to process signals varying in amplitude over a 1000 to 1 range, and lasting for time intervals of less than 175 microseconds. The system indicates the dominant spectral frequency component within 10 milliseconds after the signal has been detected. (Author)
AD-653 098 HC$3.00 MF$0.65

STIMULUS-ORIENTED APPROACH TO DETECTION RE-EXAMINED,
Texas Univ Austin Defense Research Lab
For primary bibliographic entry see Field 20A.
AD-653 123 Not available from CFSTI.

C-BAND AND X-BAND DUAL FUNCTION OSCILLATORS.
Quarterly rept. no. 2, 1 Sep-30 Nov 66,
General Electric Co Owensboro Ky Tube Dept
J. D. Marshall, and J. B. Quirk. Jun 67, 15p
ECOM-02340-2
Contract DA-28-043-AMC-02340 (E)
See also AD-653 155.

Descriptors: (*Oscillators, C band), (*X band, Oscillators), Electron tubes, Design, Circuits, Feedback, Power, Triodes, Molybdenum, Tungsten, Wire.

Effort is continuing toward the design of a grid structure that will reduce to an acceptable level the FM component of the RF output attributable to grid wire motion. Several lots of tubes were made with widely dispersed characteristics in order to determine the optimum design for operation as a dual function oscillator. Two slot-coupled CW reference oscillators were made and found to be satisfactory. It was found that an oscillator cavity, optimized for the 7910 tube type, was not optimum for the Y-1662 tube type. It will, therefore, be necessary to postpone finalization of the internal structure of the oscillator until the final tube design has been made. A change of 86 MHz in the frequencies difference between the frequency of the transmit function and that of the local oscillator function was realized by an alteration of the internal impedance ratio of the oscillator. (Author)
AD-653 154 HC$3.00 MF$0.65

C-BAND AND X-BAND DUAL FUNCTION OSCILLATORS.
Quarterly rept. no. 3, 1 Dec 66-28 Feb 67,
General Electric Co Owensboro Ky Tube Dept
J. D. Marshall, and J. B. Quirk. Jun 67, 17p
ECOM-02340-3
Contract DA-28-043-AMC-02340 (E)
See also AD-653 154.

Descriptors: (*Oscillators, *C band), (*X band, Oscillators), Electron tubes, Design, Circuits,

Feedback, Power, Triodes, Molybdenum, Tungsten, Wire.

Tube design efforts continued in the areas of grid structures and the bonded heater-cathode structure. The first grid structure to provide a spectrum with no appreciable FM content was used with the radiation-type heater-cathode structure. Tubes were fabricated incorporating this grid structure, plus minor variations, with the bonded heater-cathode structure. Because of excess power in the local oscillator function, and mechanical problems, oscillator DC-4 was discontinued in favor of oscillator No. EL-PO (X-1), to which the following modifications were made: Installation of an effective rf choke in the grid circuit; addition of a 1/8 in. tuning shaft; redesign of the feedback circuit; increased length of the oscillator body; and redesign of the heater connections. (Author)
AD-653 155 HC$3.00 MF$0.65

NECESSARY CONDITIONS FOR TRANSFORMERLESS REALIZATION OF ONE-TERMINAL PAIR RLC WITH ONE RESISTOR,
Illinois Univ Urbana Coordinated Science Lab
Abelardo Cases Sabino. May 67, 43p Rept no. R-351
Contract DA-28-043-AMC-00073 (E)

Descriptors: (*Electrical networks, Synthesis), Resistance (Electrical), Transformations (Mathematics), Theory, Electrical impedance.
Identifiers: RLC networks.

The dependence of the coefficients of the driving point functions of RLC networks on the resistors are derived. Their specialization to the case of one resistor RLC networks are then shown to lead to necessary conditions for the possibility of transformerless realization with one-resistor. (Author)
AD-653 157 HC$3.00 MF$0.65

FULL-SCALE PATTERN MEASUREMENTS OF SIMPLE HF FIELD ANTENNAS IN A US CONIFER FOREST.
Special technical rept.,
Stanford Research Inst Menlo Park Calif
William A. Ray, Gary E. Barker, and Sandra S. Martensen. Feb 67, 200p Rept no. SRI-Special TR-25
Contract DA-36-039-AMC-00040 (E), ARPA Order-371

Descriptors: (*Antennas, *Measurement), (*High frequency, Antennas), Trees, Dipole antennas, Electrical impedance, Antenna arrays, Radio transmitters, Antenna radiation patterns, Maps, Tables, Inverter circuits, Wire, Power, Aircraft, Data processing systems, Forestry, Polarization, Site selection.
Identifiers: Xeledop.

During May and June of 1965, measurements of field-expedient antenna impedance and radiation patterns were conducted in a conifer forest. The antennas measured included dipoles, slant wires, and inverted L's. The pattern measurements were conducted with an aircraft-towed transmitter. The results are presented on contour maps showing individual polarization response for elevation angles from 5 to 60 from the horizon and power response from 5 above the horizon to the zenith for several frequencies between 2 and 15 Mc/s. Input impedances are presented on Smith charts for each antenna over the frequency range that the above pattern data are presented. In addition, curves of resonant frequency and input impedance as a function of antenna height are presented for selected dipoles. The results demonstrate that the trees surrounding the antennas begin to cause perturbations to the vertical polarization response of antennas at approximately 8 Mc/s. (Author)
AD-653 165 HC$3.00 MF$0.65

OPTIMUM SPATIAL PROCESSING IN A NOISY ENVIRONMENT FOR ARBITRARY ANTENNA ARRAYS SUBJECT TO RANDOM ERRORS,
Syracuse Univ N Y Dept of Electrical Engineering
David K. Cheng, and Fung-I Tseng. 15 May 67, 44p Rept no. Scientific-3
AFCRL-67-0310
Contract AF 19 (628)-5668

Descriptors: (*Antenna arrays, *Errors), Signal-to-noise ratio, Antenna components, Band-pass filters, Noise, Environment, Bandwidth, Probability, Power, Signals, Amplitude modulation.

The report presents a procedure for the maximization of the expected signal-to-noise ratio improvement factor for arbitrary antenna arrays whose excitation amplitudes and phases as well as element positions are subject to random errors. The formation in its general form imposes no restrictions on either the probability distribution or the variance of the random errors. Correlations are allowed to exist between the random variations in array parameters, and the effect of system internal noise is considered. Computed results for a linear, endfire array in a typical noise environment are given which illustrate the dependence of the expected value and the standard deviation of the signal-to-noise ratio improvement factor on the system internal noise, the system bandwidth, the amplitude, phase and position errors, and the error correlation intervals. Typical expected power pattern functions are also plotted. (Author)
AD-653 212 HC$3.00 MF$0.65

SELF-DUALITY AND CONSTANT RESISTANCE ONE-PORTS,
California Univ Berkeley Dept of Electrical Engineering
C. A. Desoer, and K. K. Wong. 22 Aug 66, 4p
AROD-5177:10
Grants DA-ARO (D)-31-124-G576, NSF-GK-716
Availability: Published in Proceedings of the IEEE v54 n12 p1973-4 Dec 1966.

Descriptors: (*Electrical networks, Theorems), (*Resistance (Electrical), Linear systems), Systems engineering, Functions, Nonlinear systems, Time, Voltage, Electric currents, Resistors.

Using his concept of system function, Zadeh has shown that every self-dual one-port made of linear time-varying elements is a constant resistance one-port. There are given instances of constant resistance one-ports which have nonlinear, time-varying elements, and some of them are self-dual one-ports. 'Every self-dual one-port is constant resistance.' This proposition has recently acquired more importance since wide classes of self-dual one-ports can easily be generated.
AD-653 225 Not available from CFSTI.

TUNABLE 4-8 MC/S, HIGH-POWER, MODERATE- Q TRANSMITTING ANTENNA.
Research and Development rept., Feb 65-Oct 66,
Navy Electronics Lab San Diego Calif
E. A. Thowless. 7 Apr 67, 39p Rept no. NEL-1450

Descriptors: (*Antennas, *High frequency), Transmitter-receivers, Dielectric properties, Selection, Electrical impedance, Antenna components, Design, Antenna radiation patterns, Tables.

A high-frequency transmitting antenna was developed for shore-station use. The antenna allows a 40-kW PEP transmitter to operate anywhere within the 4-8 Mc/s frequency range. The low VSWR (less than 1.5:1) allows use of 1-5/8-inch, 50-ohm, semiflexible, air-dielectric coaxial line. The design permits improved space utilization at shore stations. An engineering prototype has been installed at the Naval Radio Station (T), Mare Island, Vallejo, California, for operational evaluation. (Author)
AD-653 287 HC$3.00 MF$0.65

ON COUPLED VAN DER POL OSCILLATORS.
Revised ed.,
Texas Univ Austin Dept of Electrical Engineering
J. K. Aggarwal, and C. G. Richie . 5 Jul 66, 5p
AFOSR-67-1255
Grants AF-AFOSR-766-65, NSF-GK-261
Revision of manuscript submitted 7 Feb 66.
Availability: Published in IEEE Transactions on Circuit Theory vCT13 n4 p465-6 Dec 1966.

Descriptors: (*Oscillators, *Coupling circuits), (*Topology, *Systems engineering), Differential equations, Nonlinear differential equations, Theorems, Trajectories, Transformations (Mathematics), Circuits, Capacitors, Resistors.

Oscillations described by van der Pol's, Rayleigh's and Duffing's equations have been extensively investigated. These are one-degree-of-freedom systems, and the reason behind intensive efforts on this class of systems is that analytical and topological methods may be applied to systems described by second-order differential equations. However, for higher-order equations, topological methods are not sufficiently developed, and consequently, results on systems with two or more degrees of freedom are wanting. The objective of this paper is to describe some properties of coupled oscillators, systems with several degrees of freedom.
AD-653 305 Not available from CFSTI.

ON MINIMAL MODULO 2 SUMS OF PRODUCTS FOR SWITCHING FUNCTIONS.
Technion - Israel Inst of Tech Haifa
For primary bibliographic entry see Field 12A.
AD-653 311 HC$3.00 MF$0.65

OPTIMUM CONTROL OF A CLASS OF DISTRIBUTED-PARAMETER SYSTEMS.
Revised ed.,
Ohio State Univ Columbus
H. H. Yeh, and J. T. Tou. 18 Apr 66, 9p
Contract Nonr-495 (29)
Revision of manuscript submitted 5 Jan 66.
Availability: Published in IEEE Transactions on Automatic Control vAC-12 n1 p29-37 Feb 1967.

Descriptors: (*Performance (Engineering), Control systems), Transformations (Mathematics), Integral equations, Hamiltonian, Problem solving, Partial differential equations, Integrals, Optimization, Approximation (Mathematics).

Optimum control of a class of distributed-parameter systems subject to control signal saturation is studied. The system performance is optimized with respect to an integral criterion function. This problem is solved by making use of coordinate transformation and Butkovskii's maximum principle. For this class of systems with distinct characteristic roots, the optimum control law is found to be the solution of a Fredholm integral equation of the second kind, subject to the condition of bounded signal.
AD-653 330 Not available from CFSTI.

FREQUENCY MULTIPLICATION IN HIGH-ENERGY ELECTRON BEAMS SEMIANNUAL PROGRESS REPORT, OCT. 1, 1966 - APR. 1, 1967.
Michigan Univ., Ann Arbor.
W. D. Getty, R. J. Lomax, N. A. Masnari, and J. E. Rowe, May 67, 9p NASA-CR-84409,
SAPR-1
Contract NGR-23-005-183

Descriptors: *Electron beam, *Frequency multiplier, Beam, Circuit, Cold cathode, Discharge, Electron, Frequency, High energy, Interaction, Multiplier, Optical, Plasma, Theory.

For abstract, see STAR 05 14.
N67-27368 HC$3.00 MF$0.65

PART I - APPLICATION OF ULTRA-STABLE OSCILLATORS TO ONE-WAY RANGING SYSTEMS. PART II - FLUCTUATION SPECTRA OF ULTRA- STABLE OSCILLATORS - MEASUREMENT AND ESTIMATION FINAL REPORT.
ADCOM, Inc., Cambridge, Mass.
A. F. Ghais, J. H. Miller, and H. C. Salwen. 30 Jan 67, 129p NASA-CR-84444
Contract NAS5-9705

Descriptors: *Oscillator, *Phase deviation, *Stable oscillation, *Tracking system, Deviation, Fluctuation, Measurement, Oscillation, Phase, Ranging, Spectrum, Stability, System, Tracking.

For abstract, see STAR 05 14.
N67-27427 HC$3.00 MF$0.65

A MINIMAL CAPACITOR CASCADE SYNTHESIS FOR INTEGRATED CIRCUITS.
Technical rept.,
Stanford Univ., Calif. Stanford Electronics Labs.
R. W. Newcomb, T. N. Rao, and J. Woodard. Jul 66, 45p SU-SEL-66-062, TR-6558-12
Grant NSF-GK-237

Descriptors: (*Integrated circuits, Synthesis), Capacitors, Cascade structures, Circuits, Mathematical analysis.
Identifiers: Gyrators.

Using a theory of nonreciprocal cascade synthesis based upon removal of even part admittance zeros a synthesis of resistively terminated filters was developed with reference to integrated realizations. The resulting structure was a cascade of capacitor-gyrator sections, with all gyrators grounded, and using a minimum number of capacitors all of which can be chosen equal. (Author)
PB-174 195 HC$3.00 MF$0.65

OSCILLOSCOPE PREAMPLIFIER TYPE B OR 53/54B (TEKTRONIX).
Bureau of Naval Weapons Representative, Pomona, Calif. Metrology Engineering Center.
For primary bibliographic entry see Field 9C.
PB-174 798 HC$3.00 MF$0.65

9F. TELEMETRY

THE DESIGN OF MODULAR TELEMETRY TRANSMITTERS FOR SATELLITE APPLICATIONS.
Technical memo.,
Johns Hopkins Univ Silver Spring Md Applied Physics Lab
T. Thompson, and E. H. Spedden. Mar 67, 93p
Rept no. TG-887
Contract NOw-62-0604

Descriptors: (*Telemetering transmitters, Design), (*Modules (Electronics), *Satellites (Artificial)), Performance (Engineering), Failure (Electronics), Reliability (Electronics), Quality control, Crystal oscillators, Phase modulation, Frequency multipliers, Power amplifiers, Packaging.

All solid-state telemetry transmitters of APL design were first used in APL satellites in place of commercially designed units in 1961. A second-generation transmitter composed of individual functional modules was designed to replace the original units beginning with the GEOS satellite launched in 1965. A total of fifteen satellites have used APL designed transmitters, of which four are of the newer modular configuration. As of January 1967, ten of these satellites were operational. Modular TM transmitters can be constructed with more confidence because the assembler works on a less complex unit. Testing is simpler. Quality control inspections are more rigorously defined. Six standard modules, comprising a crystal oscillator, phase modulator, frequency multiplier, and power amplifiers, are discussed in detail. In addition, present and future special-purpose modules are presented. Particular emphasis is placed on the analysis of linear phase modulators and the engineering philosophy that led to the modular concept, including packaging, testing procedures, quality control, and thermal design.
AD-652 806 HC$3.00 MF$0.65

A FUZE-TELEMETRY ANTENNA-TRANSMITTER.
Harry Diamond Labs Washington D C
Howard Bassen. Feb 67, 21p Rept no. HDL-TR-1343

Descriptors: (*Telemetering antennas, *Telemetering transmitters), Transmission lines, Circuits, Artillery, Design, Antennas, Oscillators, Fuzes (Ordnance), Very high frequency, Tables.

An integrated antenna-transmitter was developed to telemeter data from inflight artillery fuzes with minimum modification of either fuze or shell. The strip transmission line antenna provides a wide, uniform radiation pattern while providing stability to a rugged and easily fabricated VHF transmitter. Incorporation of the antenna as the tuned circuit of the oscillator stage of this FM transmitter proved to be the optimum utilization of this compact ring antenna. (Author)
AD-653 126 HC$3.00 MF$0.65

NEW SUBMINIATURE AMPLIFIER-TRANSMITTERS FOR TELEMETERING BIOPOTENTIALS,
Worcester Polytechnic Inst Mass
H. Richard Skutt, R. G. Beschle, David G. Moulton, and Werner P. Koella. 19 Sep 66, 5p
AFOSR-67-1256
Prepared in cooperation with Clark Un iv., Worcester, Mass., Dept. of Biology, Grant AF-AFOSR-1056-66; and Worcester Foundation for Experimental Biology, Shrewsbury, Mass., Grant PHS-MH-02211.
Availability: Published in Electroencephalography and Clinical Neurophyskology v22 p275-7 1967.

Descriptors: (*Telemeter systems, *Medical equipment), (*Amplifiers, *Telemetering transmitters), Subminiature electronic equipment, Calibration, Frequency, Circuits, Implants, Noise, Electrodes, Resistors, Costs, Weight, Voltage, Electrophysiology, Electrocardiography, Electroencephalography, Electromyography.

New circuits are described which allow the construction of small, light-weight, and inexpensive amplifier-transmitter units for telemetry of biopotentials. (Author)
AD-653 319 Not available from CFSTI.

INSTRUCTION MANUAL FOR HRIR MODIFICATIONS TO THE APTS GROUND STATIONS USING MUIRHEAD FACSIMILE RECORDERS.
Radio Corp. of America, Princeton, N. J. Astro-electronics Div.
22 Feb 66, 58p NASA-CR-81187, AED-M-2065
Contract NAS5-667

Descriptors: *Automatic picture transmission (apt), *Handbook, *Infrared instrument, *Instruction, Automatic, Circuit, Ground station, High resolution, Infrared, Installation, Instrument, Maintenance, Manual, Modification, Nimbus satellite, Operation, Picture, Transmission.

For abstract, see STAR 05 06.
N67-15456 HC$3.00 MF$0.65

REMARKS ON THE DOPPLER RADAR MEASURING METHOD FOR INTERIOR BALLISTICS MEASUREMENTS.
Bemerkungen Zur Dopplerradar-messmethode Fuer Innenballistische Messungen
National Aeronautics and Space Administration, Washington, D. C.
G. Schultze. Dec 66, 21p NASA-TT-F-10608
Transl. Into English Of Inst. Franco-allemand De Rech. Tech. Note 40/64, 3 Dec. 1964

Descriptors: *Doppler radar, *Interior ballistics, Amplifier, Ballistics, Circuit, Effect, Impulse, Interior, Interpolation, Measurement, Method, Oscillation, Shift, Signal.

For abstract, see STAR 05 06.
N67-15551 HC$3.00 MF$0.65

A COMPARISON BETWEEN THE VARIATIONAL SOLUTION AND THE EXPERIMENTAL DATA.
Harvard Univ., Cambridge, Mass. Gordon Mc Kay Lab.
L.-C. Shen. Sep 66, 15p NASA-CR-81239, SR-7A
Grant NSG-579

Descriptors: *Current distribution, *Dipole antenna, *Loading, *Variation method, Antenna, Current, Dipole, Distribution, Electromagnetic, Method, Pattern, Radiation, Radio, Resistivity, Variation.

For abstract, see STAR 05 06.
N67-15899 HC$3.00 MF$0.65

PROBLEMS OF BIOTELEMETRY DURING PROLONGED SPACE FLIGHTS.
Problemy Biotelemetrii V Dlitel'nykh Kosmicheskikh Poletakh
National Aeronautics and Space Administration, Washington, D. C.
I. T. Akulinichev, I. I. Popov, and A. M. Zhdanov. Nov 66, 11p NASA-TT-F-10404
Transl. Into English From Russian Presented At the 17th Intern. Astronautical Cong., Madrid, 9-15 Oct. 1966

Descriptors: *Physiological telemetry, *Space flight, Apparatus, Astronaut, Biotelemetry, Capacity, Circuit, Circulation, Design, Diagnosis, Hygiene, Medicine, Metrology, Physiology, Psychomotor, Respiration, Safety, Telemetry, Work.

For abstract, see STAR 05 14.
N67-26625 HC$3.00 MF$0.65

STUDY OF A SIGNAL PROCESSOR EMPLOYING A SYNTHETIC PHASE ISOLATOR.
Raytheon Co., Norwood, Mass.
W. J. Bickford, R. G. Cease, D. B. Cooper, and H. J. Rowland. May 67, 90p NASA-CR-728
Contract NAS12-82

Descriptors: *Antenna, *Data handling system, *Phase detector, *Signal processing, Bandwidth, Combination, Data, Detector, Evaluation, Frequency, Handling, Information, Isolator, Path, Phase, Processing, Radio, Receiver, Signal, Synthesis, System, Technique.

For abstract, see STAR 05 14.
N67-27267 HC$3.00 MF$0.65

LEAST SQUARES ANALYSIS OF UNIFIED S-BAND SYSTEM DATA FROM AS-202.
National Aeronautics and Space Administration, Goddard Space Flight Center, Greenbelt, Md.
L. Elfenbein. 3 Feb 67, 21p NASA-TM-X-55783, X-507-67-53

Descriptors: *Angular distribution, *Least squares method, *Range and range rate tracking, *S-band, Angular, Apollo spacecraft, Distribution, Least, Method, Polynomial, Range, Rate, Square, System, Tracking, Unified.

For abstract, see STAR 05 14.
N67-27283 HC$3.00 MF$0.65

EXPERIMENTAL CASSEGRAIN-FED MONOPULSE ANTENNA SYSTEM.
Hughes Aircraft Co., Fullerton, Calif.
R. T. Clark, and P. A. Jensen. May 67, 146p
NASA-CR-720
Contract NAS5-9880

Descriptors: *Cassegrain antenna, *Feed system, *Horn antenna, *Monopulse antenna, Antenna, Design, Feed, High efficiency, Horn, Low noise, Monopulse, Performance, System.

For abstract, see STAR 05 14.
N67-27292 HC$3.00 MF$0.65

AN EXPERIMENTAL STUDY OF IMPERFECTLY CONDUCTING DIPOLES.
Harvard Univ., Cambridge, Mass. Gordon Mckay Lab.
L.-C. Shen. Mar 67, 21p NASA-CR-84407, SR-8
Grant NSG-579

Descriptors: *Dipole antenna, *Ultrahigh frequency, Admittance, Antenna, Dipole, Frequency, Impedance, Imperfection, Input, Length, Measurement, Ultrahigh.

For abstract, see STAR 05 14.
N67-27366 HC$3.00 MF$0.65

CONFERENCE ON ADAPTIVE TELEMETRY.
National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
Jan 67, 225p NASA-TM-X-55747, X-731-67-7
Conf. Held At Greenbelt, Md., 15-16 Feb. 1966

Descriptors: *Adaptive control, *Conference, *Data compressor, *Decoding, *Encoding, *Information processing, *Telemetry, Adaptive, Buffer, Communication, Compression, Compressor, Computer, Control, Data, Information, Memory, Modulation, Prediction, Processing, Spacecraft.

For abstract, see STAR 05 14.
N67-27401 HC$3.00 MF$0.65

DATA COMPRESSION WITH ERROR-CONTROL CODING FOR SPACE TELEMETRY.
National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
T. J. Lynch. Jun 67, 82p NASA-TR-R-261
Contract 125-22-01-17-51

Descriptors: *Data compressor, *Error detecting code, *Telemetry, Code, Compressor, Control, Data, Detection, Distortion, Distribution, Error, Probability, Rate, Ratio, Space.

For abstract, see STAR 05 14.
N67-27614 HC$3.00 MF$0.65

10. ENERGY CONVERSION (NON-PROPULSIVE)

10A. CONVERSION TECHNIQUES

THORIA SINGLE CRYSTALS GROWN BY VAPOR DEPOSITION IN A SOLAR FURNACE,
Avco Corp Wilmington Mass Avco Space Systems Div
For primary bibliographic entry see Field 20B.
AD-652 752 Not available from CFSTI.

ELECTRIC RESPONSE OF LEAD ZIRCONATE TITANATE CERAMICS TO TEMPERATURE FLUCTUATIONS,
Massachusetts Inst of Tech Cambridge Research Lab of Electronics
For primary bibliographic entry see Field 14B.
AD-652 868 Not available from CFSTI.

ENERGY CONVERSION BY THE PHOTOSYNTHETIC APPARATUS.
Brookhaven National Lab., Upton, N. Y.
For primary bibliographic entry see Field 6A.
For abstract, see NSA 21 12.
BNL-989 HC$3.00 MF$0.65

SURFACE AND ADSORBATE STUDIES QUARTERLY REPORT, SEP. 25 - DEC. 25, 1963.
Thermo Electron Engineering Corp., Waltham, Mass.
S. S. Kitrilakis, D. Lieb, and J. H. Weinstein. 25 Dec 63, 33p NASA-CR-84148, TE41-64
Contract NAS3-2539

Descriptors: *Cesium fluoride, *Scanning device, *Thermionic converter, Cesium, Circuit, Converter, Device, Emission, Fluoride, Operation, Photoelectric, Scanning, State, Steady, Surface, Temperature, Testing, Thermionic, Transient, Tungsten.

For abstract, see STAR 05 14.
N67-26516 HC$3.00 MF$0.65

EARLY RESULTS FROM THE SOLAR CELL RADIATION DAMAGE EXPERIMENT ON ATS-1.
National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
R. C. Waddel. Apr 67, 40p NASA-TM-X-55772, X-711-67-176

Descriptors: *Applications technology satellite (ats), *Radiation effect, *Solar cell, Cell, Current, Damage, Effect, Experiment, Radiation, Shielding, Solar, Thickness, Van allen belt, Voltage.

For abstract, see STAR 05 14.
N67-26568 HC$3.00 MF$0.65

SPECTRAL RESPONSE MEASUREMENTS OF SOLAR CELLS.
National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
W. G. Gdula. Apr 67, 30p NASA-TM-X-55773, X-713-67-194
Prepared By Electro-mech. Res., Inc.

Descriptors: *Electro-optics, *Instrumentation, *Solar cell, *Spectral analysis, Analysis, Cell, Continuity, Current, Density, Diffusion, Electron, Electronic, Energy, Equation, Flow, Flux, Material, Monochromator, Photon, Radiation, Reflection, Response, Silicon, Solar, Spectral, Surface, Synchronization, Wavelength.

For abstract, see STAR 05 14.
N67-26582 HC$3.00 MF$0.65

DEPOSITION OF ALUMINUM AND SILICON OXIDE ON EPOXY-COATED SUBSTRATES.
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
F. L. Acampora, and A. E. Spakowski. Jun 67, 18p NASA-TM-X-1379
Contract 120-33-06-04-22

Descriptors: *Aluminum oxide, *Silicon oxide, *Surface layer, Aluminum, Astronomy, Coating, Concentrator, Deposition, Energy, Epoxy, Film, Layer, Optics, Oxide, Reflection, Silicon, Solar, Substrate, Surface.

For abstract, see STAR 05 14.
N67-27262 HC$3.00 MF$0.65

INVESTIGATION OF VARIABLES IN TURBINE EROSION, DROPLET FORMATION AND MATERIAL DAMAGE WITH STEAM FINAL REPORT, 30 JUN. 1965 - 31 OCT. 1966.
Rocketdyne, Canoga Park, Calif.
R. Spies. Nov 66, 100p NASA-CR-84499, R-6777
Contract NAS7-391

Descriptors: *Materials erosion, *Steam, *Turbine blade, Blade, Damage, Drop, Effect, Erosion, Formation, Geometry, Material, Size, Turbine, Vapor, Velocity.

For abstract, see STAR 05 14.
N67-27666 HC$3.00 MF$0.65

MAGNETOSOLIDMECHANIC GENERATOR.
Magnetostrophon
Thessaloniki Univ. (Greece).
B. N. Spandos. Sep 66, 14p

Descriptors: *Energy, *Magnetosolidmechanic generator, Analysis, Earth, Generator, Linear, Magnet, Magnetic equator, Motion, Pole, Rotation, Space, Space travel, Travel.

For abstract, see STAR 05 14.
N67-27779 HC$3.00 MF$0.65

10B. POWER SOURCES

CONCEPTUAL STUDY OF A MANNED UNDERWATER STATION.
General Dynamics Corp Groton Conn Electric Boat Div
For primary bibliographic entry see Field 13J.
AD-653 075 HC$3.00 MF$0.65

PORTABLE TOTAL ENERGY PACKAGE FOR ADVANCED BASE FUNCTIONAL COMPONENTS.
Naval Civil Engineering Lab Port Hueneme Calif
For primary bibliographic entry see Field 21E.
AD-653 081 HC$3.00 MF$0.65

DIRECT ENERGY CONVERSION IN THE USSR, SOVIET SOLAR CONCENTRATORS: COMPREHENSIVE REPORT,
Library of Congress Washington D C Aerospace Technology Div
Z. Litynski. 30 Nov 66, 142p Rept no. ATD-66-138
TT-67-62078
Rept. on Surveys of Foreign Scientific and Technical Literature.

Descriptors: (*Solar collectors, USSR), Solar radiation, Energy conversion, Solar furnaces, Configuration, Optical equipment, Power supplies, Thermoelectricity, Parabolic bodies, Photoelectric effect, Thermionic converters, Solar panels, Construction materials, Coatings, Reviews.

Contents: Theoretical considerations (Basic calculations of an ideal system, Calculations of a real concentrator, Attainable temperatures, Precision index, Cavity calculations); Concentrator design (Paraboloids, Multimirror systems, Parabolic-cylindrical concentrators, Other geometries); Concentrators for direct energy conversion (Concentrators for applications in space, Photovoltaic systems, Thermoelectric systems); Materials and manufacturing processes (Glass and aluminum, Reinforced concrete shells, Asbestos-cements, resins, and foam materials, Elastic membranes).
AD-653 184 HC$3.00 MF$0.65

TIME DEPENDENT NONLINEAR SOLUTION OF THE LANDAU-VLASOV EQUATIONS FOR AN ELECTRON-ION DIODE.
Michigan Univ., Ann Arbor. Electron Physics Lab.
For primary bibliographic entry see Field 12A.
AD-802 564 HC$3.00 MF$0.65

A STUDY OF GAS SOLUBILITIES AND TRANSPORT PROPERTIES IN FUEL CELL ELECTROLYTES SEMIANNUAL REPORT, 1 SEP. 1966 - 28 FEB. 1967.
Florida Univ., Gainesville. College of Engineering.
For primary bibliographic entry see Field 7D.
For abstract, see STAR 05 14.
N67-27439 HC$3.00 MF$0.65

EMISSIONS FROM COAL-FIRED POWER PLANTS: A COMPREHENSIVE SUMMARY,
National Center for Air Pollution Control, Cincinnati, Ohio.
For primary bibliographic entry see Field 13B.
PB-174 708 HC$3.00 MF$0.65

10C. ENERGY STORAGE

DEVELOPMENT OF MAGNESIUM WAFER CELLS.
Quarterly rept. no. 3, 1 Nov 66-31 Jan 67,
Burgess Battery Co Freeport Ill
Lloyd W. Eaton. Apr 67, 19p
ECOM-02135-3
Con tract DA-28-043-AMC-02135 (E)
See also AD-648 953.

Descriptors: (*Primary cells, *Magnesium), (*Dry cells, Magnesium), Batteries + components, Failure (Electronics), Thermal stability, Electric connectors, Cathodes (Electrolytic cell), Construction, Electric discharges.
Identifiers: Magnesium wafer cells.

A hypothesis was developed that the construction of the inter-cell connector provided 'free space' within the battery and that gassing within the cell, during storage at elevated temperature, caused the cell wrap to balloon into this 'free space' and partially lift the cathode collector off the cathode mix, causing a high resistance. This resistance would then increase when the battery is on discharge due to the additional gassing which occurs, lifting the cathode collector to where battery failure occurs during the first few hours of discharge. Two new constructions were developed that virtually eliminate the 'free space' within the battery. One of the constructions eliminates the material problem of the intercell connector. (Author)
AD-652 698 HC$3.00 MF$0.65

OPTIMUM STRUCTURES FOR MINIATURE Ni-Cd SEALED CELLS AND BATTERIES.
Quarterly rept. no. 2, 11 Nov 66-10 Feb 67,
Sonotone Corp Elmsford N Y
John Herrmann, Stephan Thornell, and Michael Ruberto. May 67, 69p
ECOM-02361-2
Contract DA-28-043-AMC-02361 (E)
See also AD-649 628.

Descriptors: (*Miniature electrical equipment, Alkaline cells), (*Alkaline cells, Optimization), (*Batteries + components, Miniature electrical equipment), Nickel, Cadmium, Electrodes (Electrolytic cells), Electric discharges, Stresses, Containers, Configuration.
Identifiers: Nickel-cadmium cells.

Electrochemical investigations were directed toward evaluation of 1.0 A.H. cylindrical Ni-Cd sealed cells containing pasted negative plates. The investigation also includes an evaluation of the data gathered on 1.0 and 4.0 A.H. cells that were life-cycled at the 5-hour charge rate for 200 cycles. In addition, investigations are included that evaluate charging efficiencies of the sintered positive, sintered negative, and pasted negative plates at the five-hour charge rate. Mechanical investigations were directed towards pressure tests and stress analysis of 0.016 in. thick cylindrical cell cases, geometric progression of cylindrical cells down to 0.5 A.H., geometric proportions of 4.0 A.H. rectangular cells, and battery packaging of a 6 volt, 4.0 A.H. rectangular battery with rectangular cells. Stress analysis data are not conclusive enough to determine a numerical value of unit stress. (Author)
AD-652 700 HC$3.00 MF$0.65

DEVELOPMENT OF CARBON ZINC BATTERIES CAPABLE OF STORAGE AT TEMPERATURES UP TO 160 DEGREES F.
Semi-annual report no. 1, 1 Jul-31 Dec 66,
Burgess Battery Co Freeport Ill
Terry G. Messing. Mar 67, 29p
ECOM-02391-1
Contract DA-28-043-AMC-02391 (E)

Descriptors: (*Carbon, *Batteries + components), (*Zinc, Batteries + components), Design, High-temperature research, Storage, Mechanical properties, Viscosity, Tables, Reports, Voltage.

High Temperature Carbon-Zinc Development Contract Number DA28-043-AMC-02391 (E). Discussion of development of a carbon zinc battery capable of prolonged storage at high temperatures is given. This includes a discussion of and data comparing the wafer cell and the round cell construction. A summary of the ability of the present product at these temperatures is given. The Burgess mechanically sealed cell is described and discussed. And gassing experiments conducted with certain inhibitors are given. (Author)
AD-652 720 HC$3.00 MF$0.65

SOLUTE AND CATHODE INVESTIGATIONS IN PROPYLENE GLYCOL SULFITE.
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
R. E. Johnson. Jun 67, 10p NASA-TM-X-1380
Contract 120-34-01-09-22

Descriptors: *Electrolyte, *Glycol, *Propylene, *Wet cell battery, Anode, Battery, Cathode, Cell, Conductivity, Copper, Density, High energy, Lithium, Potential, Solvent, Sulfite, Test.

For abstract, see STAR 05 14.
N67-27263 HC$3.00 MF$0.65

EVALUATION PROGRAM FOR SECONDARY SPACECRAFT CELLS - ACCEPTANCE TEST OF GULTON INDUSTRIES INCORPORATED 12 AND 20 AMPERE-HOUR ADHYDRODE CELLS.
Naval Ammunition Depot, Crane, Ind. Quality Evaluation Lab.
21 Jan 67, 17p NASA-CR-84421, QE/C-67-1
NASA ORDER W-11252-B

Descriptors: *Electrochemical cell, *Performance characteristics, *Spacecraft, Battery, Capacity, Cell, Characteristics, Control, Electrochemical, Evaluation, Immersion, Leakage, Performance, Quality, Resistance, Secondary, Test, Voltage.

For abstract, see STAR 05 14.
N67-27639 HC$3.00 MF$0.65

---

11. MATERIALS

11B. CERAMICS, REFRACTORIES, AND GLASSES

THERMODYNAMIC STUDY OF SYNTHESIS OF NEW COMPOUND PHASES UNDER HIGH PRESSURE.
Manlabs Inc Cambridge Mass
Edward V. Clougherty, and Larry Kaufman. Feb 67, 53p Rept no. Scientific-1
AFCRL-67-0290
Contract AF 19 (628)-5745

Descriptors: (*Ceramic materials, Synthesis (Chemistry)), (*Boron compounds, Synthesis (Chemistry)), (*Aluminum compounds, Synthesis (Chemistry)), (*Nitrides, Synthesis (Chemistry)), (*Antimony alloys, Synthesis (Chemistry)), Phase studies, High-pressure research, Grain boundaries, Heat of formation, Entropy, Crystal structure, Enthalpy, Diffusion.
Identifiers: Aluminum nitride, Boron antimonide, Boron nitride.

A phenomological analysis and correlation of available volumetric and entropy data was performed for the III-V compounds. The results of these procedures were used to predict the volumetric properties of the known high pressure forms of BN and the unknown forms of BSb. In addition, values for compound entropy and the entropy of formation were predicted for the above compounds, BN and BSb, and for several known III-V compounds for which such data are presently lacking. The value for the P-T coefficient, was also calculated (from the predicted quantities) for the BN transformations and for the synthesis of BSb from the elements. An experimental program was carried out to attempt to synthesize a new compound BSb. The results obtained suggest that the B-Sb system at 50 kilobars is characterized by a miscibility gap in the liquid phase. High pressure experiments were also carried out for AlN; the results obtained show that solid aluminum nitride and solid boron nitride react by a diffusion process which produces marked changes in the microhardness and morphology of the boron nitride. (Author)
AD-652 828 HC$3.00 MF$0.65

ULTIMATE STRENGTH OF CHOPPED WIRE REINFORCED SMALL SCALE MORTAR SLABS.
Protective Structures Development Center Fort Belvoir Va
For primary bibliographic entry see Field 13C.
AD-652 884 HC$3.00 MF$0.65

BETA EUCRYPTITE CRYSTALLINE SOLUTIONS INVOLVING P (5+).
Revised ed.,
American Museum of Natural History New York Dept of Animal Behavior
A. J. Perrotta, and R . O. Savage. 7 Nov 66, 1p
Revision of manuscript submitted 19 Sep 66.
Availability: Published in Journal of the American Ceramic Society v50 n2 p112 Feb 1967.

Descriptors: (*Crystals, Silicates), (*Silicates, Solid solutions), (*Phosphorus, Solid solutions), Lithium compounds, Aluminum compounds, Crystal lattices, Impurities, Phosphates.
Identifiers: Eucryptite, Lithium aluminosilicates.

The purpose of the paper is to reveal an extensive crystalline solution involving P (5+) in the framework silicate, beta-eucrytite (LiAlSiO4).
AD-653 346 Not available from CFSTI.

CERAMIC SYSTEMS FOR MISSILE STRUCTURAL APPLICATIONS.
Quarterly rept. no. 16 (Final), 1 Nov 65-31 Oct 66,
Georgia Inst. of Tech., Atlanta. Engineering Experiment Station.
Nick E. Poulos, Charles A. Murphy, William J. Corbett, Paul Boland, and Charles W. Gorton. 31 Oct 66. 250p
Contract NOw-63-0143

Descriptors: (*Ceramic materials, Hypersonic test vehicles), (*Radomes, Environmental tests), (*Slip casting, Ceramic materials), Mechanical properties, Sintering, Silicon dioxide, Composite materials, Alumina, Metal coatings, Deposition, Textiles, Panels (Structural), Fibers, Nitrides, Graphite, Boron compounds, Thermal stresses, Plastics, Halocarbon plastics.
Identifiers: Cristobalite.

Five slip-cast fused silica radomes were fabricated and evaluated in a mach 2.2, 4000 F, 140 PSIA typhon ramjet exhaust at General Dynamics/Pomona Ordnance Aerophysics Laboratory July 6-18, 1966. Test data is to be presented in a separate report prepared and published by the Johns Hopkins University, Applied Physics Laboratory, Silver Spring, Maryland. Preliminary observations are presented and it is estimated that 50 to 60 per cent of the test objectives were realized. Materials development and characterization studies of slip-cast alumina-fused silica composites and fused silica grinding for strength improvement are presented. Studies for applying metal films on slip-cast fused silica substrates for antenna applications were completed. Fabrication of felts from refractory fibers of fused silica, boron nitride, zirconia, magnesia, and silicon carbide coated graphite fibers and impregnation of a phenolic embedded ablator in these felts and comparison of thermal evaluation results of these embedded felts with standard ablators under a heat flux of 450 and 1500 BTU/sq ft-sec are described. (Author)
AD-811 146 HC$3.00 MF$0.65

11C. COATINGS, COLORANTS, AND FINISHES

A STUDY ON ELECTRODEPOSITION OF ORGANIC COATINGS FOR POSSIBLE MILITARY USAGE.
Final rept.,
Coating and Chemical Lab., Aberdeen Proving Ground, Md.
J. Frauenhoffer, and William H. Deaver. Oct 66. 26p CCL-209
Original contains color. Reproduction in B/W only after stock is exhausted.

Descriptors: (*Organic coatings, *Electrodeposition), Feasibility studies, Reviews, Electrophoresis, Electroosmosis.

A brief discussion on the electrodeposition of organic coatings is presented as the result of an extensive literature survey through recent technical journals and publications. The feasibility of the process for possible military usage was studied using a specific proprietary coating. Laboratory work on processing parameters indicated that electrodeposition would offer advantages for uniformly coating equipment with complex configurations which cannot be adequately coated by other application methods. Before this process can be extensively used more technical data on electrocoating mechanisms suitable vehicles, pigments, additives, formulation parameters and means for effectively maintaining a uniform composition during electrocoat processing will have to be developed so that the quality of the deposited films can be controlled. (Author)
AD-641 314 HC$2.00 MF$0.50

FOREST PRODUCTS LABORATORY LIST OF PUBLICATIONS ON WOOD FINISHING SUBJECTS.
Forest Products Lab Madison Wis
May 67. 14p

Descriptors: (*Wood, *Finishes + finishing), Paints, Paint primers, Bibliographies, Coatings, Preservation, Moistureproofing.

Contents: The weathering of wood; Painting characteristics of wood; Special primers and priming procedures; Composition of paint; Technique of applying paint; Technique of maintaining paint; Paint failures when wood becomes wet; Technique of exposure testing; Coatings for retarding moisture movement; Clear or natural finishes for exteriors of houses; Water repellents and water-repellent preservatives; Painting treated wood; Interior wood finishing; Miscellaneous.
AD-652 867 HC$3.00 MF$0.65

THE INFLUENCE OF A FIRE-RETARDANT UNDERCOAT ON THE BURNING CHARACTERISTICS OF A COMBUSTIBLE TOPCOAT.
Interim rept.,
Naval Research Lab Washington D C
T. R. Walton. 22 May 67. 22p Rept no. NRL-6548

Descriptors: (*Fire resistant coatings, Submarines), (*Submarines, Fire safety), Nuclear powered vessels, Paints, Chlorine compounds, Antimony compounds, Oxides, Additives, Effectiveness.

The objective of the research is to develop an interior, fire-retardant submarine paint with special performance requirements not present in currently available paints. A direct consequence of this investigation was the development of a general method for the introduction of fire retardancy into a combustible coating system without modification of the paints themselves. This was achieved by use of a thin flame-quenching undercoat in combination with the regular coating system. The fire-retardant undercoat contains high proportions of chlorinated paraffin and antimony oxide which interact under the influence of the heat to produce the powerful flame-quenching intermediate. By concentrating these fire-retardant additives in an undercoat, they are much more effective than when dispersed throughout the whole coating system. Although these fire-retardant systems will burn under the influence of an extraneous flame or fire, the burning paint film will immediately self-extinguish when this ignition source is eliminated or when that part of the film directly exposed to the fire is consumed. This performance was obtained even when four or five coats of a combustible paint were applied over only one fire-retardant undercoat. However, since these paints will be used only on noncombustible substrates, their burning characteristics were evaluated only on these types of materials, and their burning characteristics on combustible substrates were not evaluated. Although this investigation was limited to water-based paints to prevent contamination of the submarine's atmosphere with toxic organic solvents, this approach to fire retardancy appears to be applicable to any paint system. (Author)
AD-653 062 HC$3.00 MF$0.65

NEW COATING PROCESS FOR FOAMED POLYETHYLENE INSULATED TELEPHONE CABLE.
Sumitoto Electric Industries, Ltd., Yokohama (Japan).
For primary bibliographic entry see Field 17B.
For abstract, see STAR 05 14.
N67-26784 HC$3.00 MF$0.65

APPLICATION OF WELDED THIN METAL IN NEW COMMUNICATION CABLE DESIGNS.
Canada Wire and Cable Co., Ltd., Toronto (Ontario).
For primary bibliographic entry see Field 9A.
For abstract, see STAR 05 14.
N67- 788 HC$3.00 MF$0.65

PROTECTION OF TELEPHONE CABLES FROM ATTACK BY INSECTS.
Postmaster-generals Dept., Melbourne (Australia).
For primary bibliographic entry see Field 17B.
For abstract, see STAR 05 14.
N67-26807 HC$3.00 MF$0.65

FIFTEENTH-YEAR EVALUATION OF EXPERIMENTAL TEST LININGS IN SHASTA DAM PENSTOCK.
Bureau of Reclamation, Denver, Colo. Chemical Engineering Branch.
For primary bibliographic entry see Field 13M.
PB-173 590 HC$3.00 MF$0.65

CORROSION PROTECTION METHODS AND MATERIALS IN SWEDEN.
Squires (C.K.). Stockholm (Sweden).
For primary bibliographic entry see Field 5C.
PB-174 776 HC$3.00 MF$0.65

11D. COMPOSITE MATERIALS

INTERFACIAL INTERACTION IN COMPOSITE STRUCTURES.
Final rept., 20 Feb-19 Nov 66,
Alpha Research and Development, Inc., Blue Island, Ill.
William S. Layne, and Robert L. Patrick. 19 Nov 66. 74p
Contract NOw-66-0400

Descriptors: (*Composite materials, Interfaces), Surface properties, Reinforced plastics, Glass textiles, Epoxy plastics, Water, Diffusion, Rupture, Aging (Materials), Heat treatment, Tritiated compounds, Drawing (Machine processing), Radiography, Gravimetric analysis.

A program to examine the fundamental phenomena occurring at the interface of glass-resin composites is continued. The role of water at the interface is being studied by drawing E-glass rod from a melt in an anhydrous atmosphere and using it as a reference material with which to compare E-glass rods subjected to aging, treatments with A-1100 silane and water, and roasting. Model glass-epoxide composites were constructed and examined gravimetrically and radiographically for diffusion of water through them. The influence of the variables mentioned above are also examined by modulus of rupture tests and by scintillation counting, following treatments with tritiated water. (Author)
AD-644 219 HC$3.00 MF$0.65

COMPOSITE THERMOPLASTIC/GLASS FILAMENT REINFORCEMENT FOR BUOYANT SUBMARINE CABLES RG-372 (XN-1)/U AND RG-373 (XN-1)/U.
Interim rept. no. 5, 10 Feb-10 May 67,
Union Carbide Corp Bound Brook N J Research and Development Dept
P. H. Hofer, and H. J. Nalepa. 10 May 67. 46p
Contract NOO140-66-C-0403
See also AD-646 988.

Descriptors: (*Composite materials, Submarine antennas), (*Reinforced plastics, Glass textiles), (*Submarine antennas, Buoyancy), Thermoplastics, Electric wire, Coaxial cables, Physical properties, Manufacturing methods.

The feasibility of producing a buoyant submarine cable, which will meet single-conductor RG-373 (XN-1)/U specifications, has been demonstrated

Tests on cable samples, which were constructed on modified commercial equipment, confirmed that the thermoplastic/glass composites, which Union Carbide developed for cable reinforcement, were more than satisfactory. The breaking strength of the cable is more than twice the 1200 pounds specified, while the cable is substantially below the specific gravity limit. Testing at the U. S. Navy Underwater Sound Laboratory showed that the samples produced met all the requirements for the RG-373 cable except for watertightness. The first attempt to produce coaxial cable with Union Carbine's thermoplastic/glass composites as strength members was made. Although the composites presented no problems throughout the run, the finished cable was not satisfactory. The waterproofing compound and techniques normally used proved unsuitable in the RG-372 construction. In addition, the cellular polyethylene jackets were not of the proper density.
AD-652 810 HC$3.00 MF$0.65

THERMOGRAVIMETRY OF PHENOL-FORMALDEHYDE POLYCONDENSATES. PART II. EMPIRICAL KINETIC PARAMETERS.
Air Force Materials Lab Wright-Patterson AFB Ohio
For primary bibliographic entry see Field 111.
AD-652 844 HC$3.00 MF$0.65

TESTING TECHNIQUES FOR FILAMENT REINFORCED PLASTICS. SYMPOSIUM HELD SEPTEMBER 21 TO 23, 1966 AT DAYTON, OHIO.
Air Force Materials Lab., Wright-Patterson AFB, Ohio.
Sep 66, 858p AFML-TR-66-274

Descriptors: (*Filament wound construction, Test methods), (*Reinforced plastics, Symposia), Boron, Filaments, Fatigue (Mechanics), Non-destructive testing, Glass textiles, Pressure, Composite materials, Stresses, Glass, Hydrostatic tests, Cryogenics, Temperature.

The report presents a detailed description of recent advancements made in testing techniques for filament reinforced plastics which have occurred since the last test methods symposium held in May 1962. The report presents all of the technical papers available given at the Air Force Materials Laboratory-American Society for Testing and Materials Test Methods Symposium held September 21 to 23, 1966 at the Sheraton-Dayton Hotel, Dayton, Ohio and was designed to serve as a basis for discussions at this symposium. The subject matter is arranged in order of presentation in four specific catagories: I - Testing techniques, II - Fatigue testing, III - Testing techniques for design, and IV - Nondestructive testing. (Author)
AD-801 547 HC$3.00 MF$0.65

MECHANICAL PROPERTIES OF EPOXY RESINS AND GLASS/EPOXY COMPOSITES AT CRYOGENIC TEMPERATURES.
Aerojet-general Corp., Azusa, Calif. Von Karman Center.
For primary bibliographic entry see Field 111.
For abstract, see STAR 05 14.
N67-27217 HC$3.00 MF$0.65

EXPERIMENTAL EVALUATION OF HIGH-PURITY-SILICA REINFORCED ABLATIVE COMPOSITES AS NOZZLE SECTIONS OF 7.8-INCH-/19.8 CM/ DIAMETER THROAT STORABLE-PROPELLANT ROCKET ENGINE.
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
For primary bibliographic entry see Field 21H.
For abstract, see STAR 05 14.
N67-27286 HC$3.00 MF$0.65

APPLICATION OF THE METHODS OF LIMIT ANALYSIS TO THE EVALUATION OF THE STRENGTH OF FIBER-REINFORCED COMPOSITES.
General Electric Co., Philadelphia, Pa. Missile and Space Div.
B. W. Rosen, and L. S. Shu. Jan 67, 38p NASA-CR-84450
Contract NASW-1377

Descriptors: *Composite material, *Plasticity, *Reinforced material, *Shear strength, *Yield strength, Analysis, Binder, Composite, Elastic, Fiber, Limit, Material, Matrix, Plastic, Reinforced, Shear, Strength, Tension, Yield.

For abstract, see STAR 05 14.
N67-27421 HC$3.00 MF$0.65

METAL CARBIDE-GRAPHITE COMPOSITES QUARTERLY REPORT.
IIT Research Inst., Chicago, Ill.
25 Apr 67, 36p NASA-CR-84437, IITRI-66003-3
Contract NASR-65/09/

Descriptors: *Carbide, *Composite material, *Graphite, *High temperature alloy, *Hot pressing, Alloy, Composite, Fabrication, Hafnium, High temperature, Material, Mechanical, Metal, Physical, Property, Tantalum, Zirconium.

For abstract, see STAR 05 14.
N67-27434 HC$3.00 MF$0.65

11E. FIBERS AND TEXTILES

DEVELOPMENT OF A CREPE FABRIC FOR USE IN SCARFS.
Final rept., Sep 65-Apr 66,
Prodesco, Inc., Perkasie, Pa.
H. E. Brockman. Aug 66, 16p PAF-34
SEG-TR-66-37
Contract AF 33 (657)-15386

Descriptors: (*Textiles, Clothing), (*Clothing, Air force personnel), Acceptability, Costs, Colors, Polyester plastics, Rayon, Specifications, Manufacturing methods, Fibers, Dyes.
Identifiers: Crepe.

The purpose of this development was to provide an improved scarf fabric for use by Air Force personnel for wear with the improved fatigue uniform whenever field conditions or formations require a 'dressed-up' appearance. The crepe fabric was to be lightweight, durable, cleanable, washable, and be colorfast to sunlight. The fabric produced was a blend of 75% polyester and 25% rayon. The fabric developed was considered successful and could be manufactured by textile weaving concerns at a reasonable cost. The color of the fabric was ultramarine blue. (Author)
AD-644 193 HC$3.00 MF$0.65

FIBROUS REINFORCEMENTS FOR SPACE APPLICATIONS.
Whittaker Corp., San Diego, Calif.
May 67, 42p NASA-CR-796
Contract NAS7-407

Descriptors: *Polymer, *Reinforcing fiber, *Space environment, *Structural material, Cellulose, Environment, Ether, Fiber, Film, Ladder, Material, Plastics, Polyamide, Polyester, Polyimide, Polyurethane, Property, Reinforcement, Space, Structural.

For abstract, see STAR 05 14.
N67-27302 HC$3.00 MF$0.65

11F. METALLURGY AND METALLOGRAPHY

X-RAY SPECTROCHEMICAL METHODS FOR ANALYSIS OF COPPER ALLOYS.
Technical rept.,
Army Weapons Command Rock Island Ill Research and Engineering Div
Leeland H. Moorhead, and Oren J. Littig. Mar 67, 44p
RIA-67-849

Descriptors: (*Copper alloys, *Quantitative analysis), Nuclear radiation spectrometers, Standards, Solutions, Aluminum alloys, Nickel alloys, Bronze.

X-ray spectrochemical methods were developed for both solid and solution samples. Solid standards were prepared in an induction furnace or a small arc furnace. The standards were analyzed by wet chemical methods and by X-ray solution techniques. Analytical working curves were prepared for manganese bronzes, aluminum bronzes, and brasses using the Rock Island Arsenal secondary standards and available primary standards. Problems of short time instrumental drift were minimized by alternating samples and standards and averaging results. Problems in long time instrumental drift were solved by applying a mathematical computation method suggested by Loranger. (Author)
AD-652 733 HC$3.00 MF$0.65

RESEARCH AND DEVELOPMENT OF PHYSICAL METALLURGY OF TITANIUM.
Final rept., 1 Aug 65-30 Jun 66,
IIT Research Inst Chicago Ill
Frank A. Crossley. Apr 67, 205p Rept no. IITRI-B6041-12
NSRDC-114/67
Contract Nonr-4766 (00)

Descriptors: (*Titanium alloys, *Metallurgy), (*Aluminum alloys, *Additives), Chemical analysis, Chemical precipitation, Grain boundaries, Impact shock, Shock resistance, Phase studies, Toughness, Stabilization, Solubility, Mechanical properties, Mathematical prediction, Tensile properties, Ductility, Tin alloys, Chemical equilibrium.

The objectives of the program were to determine the following: (1) the effects of the ternary alpha-soluble additions oxygen, tin, and zirconium, and the beta-stabilizing additions columbium, molybdenum, and vanadium on the extent of Ti-Al primary alpha; (2) the effects of these ternary additions on the kinetics of precipitation of Ti3Al; and (3) the relationships of the foregoing to mechanical properties. The most significant findings of the three-part study were as follows: Oxygen, Zr, Cb, Mo, and V decreased the extent of primary alpha; on the other hand, Sn increased the extent of primary alpha. Extrapolation of data for higher temperatures suggested that below 700C, V may increase the extent of primary alpha in terms of total substitutional solutes. The kinetics study showed that displacement in time between the Ti3Al precipitation reaction at grain boundaries and within grains is significant in Ti-Al binary and Ti-Al-Sn ternary alloys. Additions of Zr, Cb, Mo, and V retarded the precipitation reaction and appeared to inhibit or suppress it at grain boundaries. The nose of the TTT curves for the precipitation reaction was about 650C. Impact resistance and tensile ductility went through a minimum upon aging at 650C and were completely recovered in 500 hr for the Ti-7.1 wt pct Al alloy.
AD-652 829 HC$3.00 MF$0.65

ANODIC DISINTEGRATION OF METALS UNDERGOING ELECTROLYSIS IN AQUEOUS SALT SOLUTIONS.
Technical rept.,
Missouri Univ Rolla
W. J. James, M. E. Straumanis, and J. W. Johnson. Jun 67, 11p Rept no. TR-17
Contract Nonr-2296 (03)

Presented at the Conference, National Association of Corrosion Engineers (22nd), Miami Beach, Fla., April 18-22, 1966.
Availability: Published in Corrosion v23 n1 p15-23 Jan 1967.

Descriptors: (*Corrosion, *Electrochemistry), (*Beryllium, Electrolysis), (*Magnesium, Electrolysis), (*Cadmium, Electrolysis), (*Zinc, Electrolysis), Salts, Solutions, Oxidation-reduction reactions, Reaction kinetics, Etching, Grain structures (Metallurgy), Decomposition.

Mechanisms of the anodic dissolution of metals in aqueous salt solutions are reviewed and discussed. The review places particular emphasis on metals which have been studied in the authors' laboratories. (Author)
AD-652 912 Not available from CFSTI.

TRANSFORMATIONS IN Fe-Co ALLOYS,
Windsor Univ (Ontario)
J. Gordon Parr. 1966, 3p
Grant DRB-9535-16
Availability: Published in Journal of the Iron and Steel Institute v205 p426-7 Apr 1967.

Descriptors: (*Iron alloys, *Transformations), (*Cobalt alloys, *Temperature), Cooling, Alloys, Carbon, Rods, Measurement, Accuracy, Nickel, Manganese, Chromium, Annealing, Thermal analysis, Sampling, Thermocouples, Quenching (Cooling), Welding, Tables.

Values of Ms in Fe-Co alloys containing between 0.1 and 24% Co show a minimum of (about) 600C at 1%Co. Extrapolation of Ms values for the dilute alloys suggests an Ms in pure iron of 740C. These alloys also show a similarity to Fe-Ni alloys in the appearance of two constant temperature plateaux in the graphs of transformation temperature v. cooling rate. (Author)
AD-652 947 Not available from CFSTI.

ELECTROMAGNETIC INSPECTION OF HARDENED STEEL.
Memo. rept.,
Frankford Arsenal Philadelphia Pa Fire Control Development and Engineering Labs
Theodore A. Cox. Apr 67, 63p
FA-M67-24-1
See also AD-621 844.

Descriptors: (*Steel, *Non-destructive testing), Hardness, Test methods, Electric currents, Probes, Case hardening, Tempering, Effectiveness, Tool steel, Heat treatment, Grain structures (Metallurgy).
Identifiers: Eddy currents.

A program was undertaken to investigate the use of eddy current test techniques for: (1) The measurement of case depth on steel parts processed by heat treat methods (no carbon added to the surface), and (2) The determination of through hardness or tempering temperature history of Stentor tool steel and 4340 steel parts. Eddy current tests showed that the relationship of case depth to eddy current output had insignificant correlation. The effects of case depth variation appeared to be obscured by the effects of other material variations such as hardness and grain structure. The effectiveness of phase sensitive and harmonic eddy current test methods for determining tempering temperature history of 4340 and Stentor tool steels was evaluated by performing numerous tests on specially prepared specimens. Eddy current tests utilizing third harmonics of the probe energizing frequency showed that tempering temperature history of 4340 and Stentor steel can be determined for all temperatures (265 F to 820 F) used for specimen preparation on this program.
AD-653 007 HC$3.00 MF$0.65

SELF-DIFFUSION IN NEAR-EQUIATOMIC ORDERED Au-Cd ALLOYS.
Illinois Univ Urbana Materials Research Lab
For primary bibliographic entry see Field 20L.
AD-653 058 Not available from CFSTI.

FATIGUE OF STRUCTURAL ELEMENTS. STUDY OF RESIDUAL STRESSES IN LINEARLY VARYING BIAXIAL STRESS FIELDS.
Naval Applied Science Lab Brooklyn N Y
For primary bibliographic entry see Field 20K.
AD-653 068 HC$3.00 MF$0.65

TRANSIENT ANALYSIS IN FRACTURING ALUMINUM PLATE.
Washington Univ Seattle Dept of Mechanical Engineering
For primary bibliographic entry see Field 20K.
AD-653 073 HC$3.00 MF$0.65

SHOCK-INDUCED TRANSFORMATION OF TITANIUM-NICKEL ALLOYS,
Naval Ordnance Lab White Oak Md
N. L. Coleburn. 1 May 67, 33p Rept no. NOLTR-67-78

Descriptors: (*Nickel alloys, Shock waves), (*Titanium alloys, Shock waves), (*Shock waves, *Phase studies), Compressive properties, Explosion effects, Grain structures (Metallurgy), Martensite, Intermetallic compounds, Thermal properties.

The report describes the behavior under shock wave compression of three compound alloys of titanium and nickel. Explosive-propelled metal plates transmitted pressures of up to 0.8 megabar in specimens with 50.3 atomic % Ni, 51.4 atomic % Ni, and 55.0 atomic % Ni. Shock wave and free-surface velocities were measured optically. The corresponding compression points were determined from the Rankine-Hugoniot equations. The data reveal that the dynamic compressibilities of Ti-Ni alloys are sensitive to temperature changes. At 90 kbars the microstructure of the near stoichiometric 50.3 atomic % Ni undergoes an almost complete martensitic transformation. The transformation is less evident in 51.4 atomic % Ni. The 55.0 atomic % Ni alloy is unchanged by the 90-kbar shock. At 270-280 kbars the shock velocity in stoichiometric Ti-Ni specimens, initially at 15C, becomes insensitive to pressure. The formation of a new phase is indicated. (Author)
AD-653 080 HC$3.00 MF$0.65

COUNTER-GRAVITY CASTING OF ALUMINUM ALLOYS IN GREEN SAND MOLDS,
Frankford Arsenal Philadelphia Pa Pitman-Dunn Research Labs
Fred Ripkin, and Samuel Lipson. Feb 67, 39p
FA-R-1836

Descriptors: (*Aluminum alloys, *Casting), Gravity, Sand, Molding materials, Tensile properties, Ductility, Viscosity, Metals, Turbulence, Mechanical properties, Pressure.

An apparatus for counter-gravity pouring of aluminum alloys into sand molds has been designed and its operation demonstrated. It was shown that such parameters as flow rate, casting pressure, and pouring temperature can be closely controlled. The upward flow of metal into the mold is caused by movement of a rubber diaphragm; air pressure under the diaphragm forces a sand bed to rise and the liquid metal resting on the sand is thus lifted into the mold. It was found that under controlled pouring conditions, generally higher tensile strengths and markedly greater ductility can be obtained with cast-to-size 0.505 in tensile test bars than is possible with conventional gravity practices. Markedly improved mechanical properties were also realized by counter-gravity casting of a mortar base plate as compared to properties obtained with the same casting procured from commercial sources. Turbulent flow conditions resulting from excessively high flow rates severely degraded the properties of the cast material even when the counter-gravity practices were employed. In another test casting (a finned aluminum alloy 142 cylinder head), it was shown that misruns in the fin areas could be reliably eliminated through controlled counter-gravity pouring. Fluidity tests were also conducted to demonstrate the effect of various pouring parameters on the length of a fluidity spiral. (Author)
AD-653 148 HC$3.00 MF$0.65

METHODS FOR MINIMIZING THE EMBRITTLING EFFECT OF HYDROGEN IN ELECTROPLATED HIGH STRENGTH ALLOY STEEL ITEMS.
Final engineering rept.,
Frankford Arsenal Philadelphia Pa
Edward E. Dougherty. Mar 63, 37p
Rept. on Industrial Engineering Proj.

Descriptors: (*Embrittlement, *Steel), (*Alloys, Steel), Electroplating, Mechanical properties, Hydrogen, Structural properties, Cadmium, Theory, Chromuim, Tests.

The paper contains methods for eliminating hydrogen embrittlement of cadmium and chromium electroplated ultra high strength alloy steel items for cartridge or propellant actuated devices. Since the initiation of the project, it has been concluded that the only way to completely eliminate hydrogen embrittlement is to avoid completely the introduction of hydrogen into the item being plated. Methods to minimize embrittlement, to the point that it will not interfere with the function of applicable items, have been determined. (Author)
AD-653 156 HC$3.00 MF$0.65

MONOTONIC AND COMPLETELY REVERSED CYCLIC STRESS-STRAIN AND FATIGUE BEHAVIOR OF REPRESENTATIVE AIRCRAFT METALS.
Final rept., 1 Feb 65-1 Feb 66,
Illinois Univ Urbana Dept of Theoretical and Applied Mechanics
T. Endo, and JoDean Morrow. Jun 66, 38p
NAEC-ASL-1105
Contract N156-46083

Descriptors: (*Aluminum alloys, Mechanical properties), (*Steel, Mechanical properties), (*Titanium alloys, Mechanical properties), Aircraft, Metals, Stresses, Strain (Mechanics), Fatigue (Mechanics), Plasticity, Elasticity, Tensile properties.
Identifiers: Aluminum alloy 7075, Aluminum alloy 2024, Steel 4340, Titanium alloy 8Al 1Mo 1V.

Monotonic and cyclic stress-strain and fatigue behavior in the life range of approximately 10 to 100,000 cycles are experimentally determined for 2024-T4 and 7075-T6 aluminum alloys, SAE 4340 steel (quenched and tempered at 1000F), and titanium alloy 8-1-1. The purpose of the investigation is to establish the necessary materials information and base line fatigue data for cumulative damage studies. Plots of the fatigue life as function of elastic, plastic and total strain at half the fatigue life are presented for the four metals. The usual log-log linear relationships between fatigue life and the elastic and plastic components of strain do not satisfactorily fit the fatigue results, especially for the two aluminum alloys. Thus, it will be necessary to use the actual fatigue plots rather than simple power functions as the base line fatigue data for cumulative damage studies. (Author)
AD-653 282 HC$3.00 MF$0.65

LATTICE PARAMETERS OF IRON-RICH IRON-GALLIUM ALLOYS,
California Univ San Diego La Jolla Dept of Physics

For primary bibliographic entry see Field 7D.
AD-653 304 Not available from CFSTI.

THE MICROBIAL CORROSION OF IRON.
Final rept., Nov 58-Dec 64,
Miami Univ Fla Inst of Marine Science
Carl H. Oppenheimer. Mar 67, 18p
Contract Nonr-840 (21)
Prepared in cooperation with Texas Univ., Austin. Inst. of Marine Science; Contract Nonr-375 (10), Proj. NR-103-433.

Descriptors: (*Iron, Corrosion), Microorganisms, Marine biology, Biological contamination, Oxygen consumption, Enzymes.

The investigation showed the potential and magnitude for microbial corrosive effects on iron in marine environments. Aerobic and anaerobic corrosion cells can be developed by a wide variety of microorganisms. Aerobic corrosion is developed through metabolic oxygen consumption by bacteria on localized iron surfaces where organic food is present. Alternating bands of aerobic-anaerobic zones are formed in sediments by layering effects of deposition involving different amounts of organic materials. The layering does produce oxygen differential cells that are very corrosive. Anaerobic corrosion cells are produced by depolarization of the iron due to proton or hydrogen uptake. The activity is proportional to hydrogenase activity or to the presence of hydrogen acceptors in the area. Suitable tests involving weight loss of iron test coupons can be employed to show the corrosive nature of microorganisms in the environment. (Author)
AD-653 368 HC$3.00 MF$0.65

MECHANICAL PROPERTIES OF SOME TANTALUM ALLOYS,
Case Inst of Tech Cleveland Ohio
T. E. Mitchell, and P. L. Raffo. 1967, 17p
AFOSR-67-1262
Grant AF-AFOSR-829-65
Prepared for presentation at the International Conference on the Deformation of Crystalline Solids, Ottawa, August 22-26 1966.
Availability: Published in Canadian Journal v45 n2 pt3 p1047-62 Feb 1967.

Descriptors: (*Tantalum alloys, Mechanical properties), Rhenium alloys, Molybdenum alloys, Tungsten alloys, Single crystals, Deformation, Stresses, Brittleness, Crystal lattices, Hardening, Crystal lattice defects, Elasticity, Refractory metals.

The mechanical properties of a series of Ta-Re alloys and some Ta-Mo and Ta-W alloys were investigated by deforming single crystals in compression. Experimental results on slip-line observations, stress-strain curves, yield stresses and anisotropic elastic constants are presented. Slip occurs on the (110) planes; twinning is never observed and the alloys become increasingly brittle as the solute concentration is increased or the temperature is decreased. Yield stress versus composition curves show a minimum at low temperatures. It is suggested that this is due to a reduction in the intrinsic lattice friction stress of the pure metal by alloying, before alloy hardening is able to increase the yield stress again. The alloy hardening was analyzed and the yield stress the solute concentration, and 1/2 the temperature are related mathematically. Comparisons with other b.c.c. alloys were made and it is found that the rate of alloy hardening is directly proportional to the atomic size misfit in most of the alloys where data are available for single crystals. (Author)
AD-653 379 Not available from CFSTI.

SOME EXPERIMENTAL ASPECTS OF DIFFUSION IN METALS,
Arizona Univ Tucson Dept of Physics

For primary bibliographic entry see Field 20L.
AD-653 386 Not available from CFSTI.

EINIGE BEMERKUNGEN ZU EINER ARBEIT VON W. KOSTER UND H.-P. RAVE UBER 'LEITFAHIGKEIT UND HALLKONSTANTE' (Some Remarks on a Paper by W. Koster and H.-P. Rave 'Conductivity and Hall Constant'),
National Research Council of Canada Ottawa (Ontario) Div of Applied Chemistry
For primary bibliographic entry see Field 20C.
AD-653 397 Not available from CFSTI.

A STUDY OF TUNGSTEN-TECHNETIUM ALLOYS.
Quarterly progress rept., 1 Jan-1 Apr 66,
Battelle-Northwest, Richland, Wash. Pacific Northwest Lab.
R. S. Kemper, and D. P. O'Keefe. Mar 67, 7p
Contract AT (45-1)-1830

Descriptors: (*Tungsten alloys, *Technetium), Ductility, Fission products, Radioactive waste, Separation, Purification, Powder metals, Transition temperature.

For abstract, see NSA 21 12.
BNWL-378 HC$3.00 MF$0.65

BETA-TO-ALPHA TRANSFORMATION CHARACTERISTICS OF SOME DILUTE URANIUM ALLOYS,
Mallinckrodt Chemical Works, Weldon Spring, Mo. Uranium Div.
For primary bibliographic entry see Field 18J.
For abstract, see NSA 21 02.
MCW-1506 HC$3.00 MF$0.65

GENERATION OF LONG TIME CREEP DATA ON REFRACTORY ALLOYS AT ELEVATED TEMPERATURES QUARTERLY REPORT, 26 MAR. - 26 JUN. 1966.
TRW Equipment Labs., Cleveland, Ohio. Materials Research and Development Dept.
J. C. Sawyer, and E. A. Steigerwald. 15 Jul 66, 93p
NASA-CR-72044, QR-12
Contract NAS3-2545

Descriptors: *Creep, *Graph, *Molybdenum alloy, *Table, *Tantalum alloy, *Tungsten alloy, Alloy, Analysis, Gas, Molybdenum, Niobium, Refractory, Tantalum, Titanium, Tungsten, Zirconium.

For abstract, see STAR 05 14.
N67-26634 HC$3.00 MF$0.65

ADVANCED REFRACTORY ALLOY CORROSION LOOP PROGRAM QUARTERLY PROGRESS REPORT, PERIOD ENDING 15 JAN. 1967.
General Electric Co., Cincinnati, Ohio.
R. W. Harrison. 28 Jan 67, 56p NASA-CR-72230, QPR-7
Contract NAS3-6474

Descriptors: *Corrosion, *Heat treatment, *Loop, *Refractory alloy, Alkali, Alloy, Heat, Lithium, Metal, Molybdenum, Niobium, Purification, Refractory, Tantalum, Treatment, Tubing.

For abstract, see STAR 05 14.
N67-26638 HC$3.00 MF$0.65

THE INFLUENCE OF STRAIN RATE AND STRAIN AGEING ON THE FLOW STRESS OF COMMERCIALLY PURE ALUMINUM.
Israel Inst. of Tech., Haifa. Material Mechanics Lab.
S. R. Bodner, and A. Rosen. Aug 66, 43p MML-3, SR-1
Contract AF 61/052/-951

Descriptors: *Aluminum, *Strain aging, *Strain rate, *Stress analysis, Aging, Analysis, Flow, Influence, Loading, Mechanics, Property, Rate, Strain, Stress, Tensile.

For abstract, see STAR 05 14.
N67-26676 HC$3.00 MF$0.65

EFFECT OF CLADDING ON EXTRUDABILITY AND PROPERTIES OF POWDER-METALLURGY TUNGSTEN.
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
T. B. Herbell, C. A. Hoffman, and J. W. Weeton. May 67, 22p NASA-TN-D-3941

Descriptors: *Cladding, *Extrusion, *Mechanical property, *Powder metallurgy, *Tungsten, Effect, Grain, Hardness, Mechanical, Metallurgy, Molybdenum, Powder, Property, Size, Strength, Temperature, Tensile.

For abstract, see STAR 05 14.
N67-27226 HC$3.00 MF$0.65

ELEVATED TEMPERATURE FATIGUE OF TZC MOLYBDENUM ALLOY UNDER HIGH FREQUENCY AND HIGH VACUUM CONDITIONS.
TRW Equipment Labs., Cleveland, Ohio. Materials Research and Development Dept.
C. R. Honeycutt, T. F. Martin, J. C. Sawyer, and E. A. Steigerwald. May 67, 28p NASA-CR-72241, REPT.-1
Contract NAS3-6010

Descriptors: *Fatigue test, *High frequency, *Molybdenum alloy, *Refractory alloy, *Vacuum chamber, Alloy, Chamber, Creep, Cyclic, Fatigue, Frequency, High, Life, Load, Molybdenum, Recrystallization, Refractory, Static, Strength, Stress, Test, Vacuum.

For abstract, see STAR 05 14.
N67-27236 HC$3.00 MF$0.65

STRETCH FORMING OF VERY LONG STAINLESS STEEL SKINS.
Hawker Siddeley Aviation, Ltd., London (England).
For primary bibliographic entry see Field 13H.
For abstract, see STAR 05 14.
N67-27257 HC$3.00 MF$0.65

CAVITATION DAMAGE IN LIQUID METALS (POTASSIUM STUDIES) TECHNICAL PROGRESS REPORT, 1 NOV. - 31 DEC. 1966.
Hydronautics, Inc., Laurel, Md.
H. S. Preiser, S. L. Rudy, and A. Thiruvengadam. 3 Mar 67, 34p NASA -CR-72232, TPR-607-3
Contract NAS3-8506

Descriptors: *Cavitation, *High temperature alloy, *Liquid potassium, *Refractory alloy, *Stainless steel, Alloy, Carbon, Damage, High temperature, Liquid, Mechanical, Metal, Niobium, Potassium, Property, Rate, Refractory, Resistance, Stainless, Steady, Steel, Strength, Tantalum, Test, Time, Zirconium, Zone.

For abstract, see STAR 05 14.
N67-27305 HC$3.00 MF$0.65

MATERIALS DATA HANDBOOK - ALUMINUM ALLOY 2014.
Syracuse Univ. Research Inst., N. Y. Dept. of Chemical Engineering and Metallurgy.
J. G. Sessler, and V. Weiss. Apr 66, 195p NASA-CR-84454
Contract NAS8-11345

Descriptors: *Aluminum alloy, *Handbook, *Mechanical property, *Metallurgy, *Physical property, Alloy, Aluminum, Ambient, Corrosion, Cryo-

genic, Design, Environment, Fabrication, High temperature, Joining, Manufacturing, Mechanical, Physical, Property, Space, Temperature.

For abstract, see STAR 05 14.
N67-27420 HC$3.00 MF$0.65

DEVELOPMENT OF A RAPID STRESS CORROSION TEST FOR ALUMINUM ALLOYS ANNUAL REPORT, 1 MAR. 1966 - 1 MAR. 1967.
Kaiser Aluminum and Chemical Corp., Spokane, Wash. Dept. of Metallurgical Research.
N. J. Helfrich. 15 Mar 67, 64p NASA-CR-84441
Contract NAS8-20285

Descriptors: *Aluminum alloy, *Corrosion test, *Stress corrosion, Acceleration, Acid, Alloy, Aluminum, Chloride, Chromium, Compound, Corrosion, Oxygen, Potassium, Salt, Sodium, Solution, Stress, Test.

For abstract, see STAR 05 14.
N67-27430 HC$3.00 MF$0.65

STRESS CORROSION CRACKING OF TITANIUM ALLOYS AT AMBIENT TEMPERATURE IN AQUEOUS SOLUTIONS PROGRESS REPORT, JUN. - AUG. 1966.
Douglas Aircraft Co., Inc., Newport Beach, Calif. Astropower Lab.
C. B. Gilpin. Oct 66, 26p NASA-CR-84472, SM-49105-Q1
Contract NAS7-488

Descriptors: *Crack propagation, *Stress corrosion, *Titanium alloy, Alloy, Aluminum, Ambient, Aqueous, Chloride, Composition, Corrosion, Crack, Distribution, Effect, Electrochemistry, Fracture, Hydrogen, Microstructure, Propagation, Sodium, Solution, Stress, Temperature, Tin, Titanium, Vanadium.

For abstract, see STAR 05 14.
N67-27506 HC$3.00 MF$0.65

METALLURGICAL ANALYSIS OF FILTER HOUSING ASSEMBLY 60 B83104-1, SERIAL NUMBER 6 DEG FAILURE.
Boeing Co., Seattle, Wash. Launch Systems Branch.
For primary bibliographic entry see Field 13I.
For abstract, see STAR 05 14.
N67-27509 HC$3.00 MF$0.65

METALLURGICAL ANALYSIS OF HANDLING TOOL FORWARD BOOSTER ASSEMBLY.
Boeing Co., Seattle, Wash. Launch Systems Branch.
For primary bibliographic entry see Field 13I.
For abstract, see STAR 05 14.
N67-27510 HC$3.00 MF$0.65

LITERATURE SEARCH ON THE MANUFACTURE OF LAYERS OF MOLYBDENUM, TUNGSTEN, AND RHENIUM BY THERMAL DECOMPOSITION OF THEIR CARBONYLS OR REDUCTION OF VOLATILE HALIDES.
Literaturbericht Uber Die Herstellung Von Schichten Aus Molybdan, Wolfram Und Rhenium Durch Thermische Zersetzung Ihrer Carbonyle Oder Durch Redukhon Von Fluchtigen Halogeniden
Scientific Translation Service, La Canada, Calif.
M. Kadner. May 67, 12p NASA-TT-F-10914
Contract NASW-1496
Transl. Into English From Battelle Inst. Res. Rept. K66-09

Descriptors: *Molybdenum compound, *Rhenium compound, *Tungsten compound, *Vapor deposition, Carbonyl, Chloride, Coating, Compound, Decomposition, Deposition, Fluoride, Hydrogen, Layer, Manufacturing, Method, Molybdenum, Protection, Reduction, Rhenium, Tungsten, Vapor.

For abstract, see STAR 05 14.
N67-27531 HC$3.00 MF$0.65

A STUDY OF THE BLISTERING OF METAL SURFACES BY SOLAR SYSTEM IONS QUARTERLY PROGRESS REPORT, 14 JUN. - 14 SEP. 1966.
Avco Corp., Tulsa, Okla. Electronics Div.
J. A. Cooley. 14 Sep 66, 35p NASA-CR-84422, TR-66-G230-1
Contract NASW-1431

Descriptors: *Metal surface, *Proton irradiation, *Radiation effect, *Solar proton, Aluminum, Blister, Effect, Electron, Evolution, Hydrogen, Irradiation, Mass, Metal, Microscope, Oxide, Proton, Radiation, Solar, Spectrometry, Surface.

For abstract, see STAR 05 14.
N67-27701 HC$3.00 MF$0.65

METALWORKING EQUIPMENT IN THAILAND.
Coordination Center for Southeast Asian Studies, Bangkok (Thailand).
For primary bibliographic entry see Field 5C.
PB-174 779 HC$3.00 MF$0.65

11G. MISCELLANEOUS MATERIALS

MECHANISMS OF ENERGY TRANSFER IN DIELECTRICS.
New York Univ N Y Radiation and Solid State Lab
For primary bibliographic entry see Field 20C.
AD-652 723 HC$3.00 MF$0.65

CHEMILUMINESCENT MATERIALS.
American Cyanamid Co Stamford Conn Central Research Div
For primary bibliographic entry see Field 7E.
AD-653 090 Not available from CFSTI.

RESEARCH AND APPLICATION PROGRAM FOR A SOLID CHEMILUMINESCENT REACTANT.
Final rept., 16 Mar 66-31 Mar 67,
TRW Systems Redondo Beach Calif
E. D. Guth, and G. Schlesinger. 31 Mar 67, 124p
Rept no. 05206-6004-R000
Contract DA-04-495-AMC-796 (A)

Descriptors: (*Chemiluminescence, Materials), (*Signal lights, Chemiluminescence), (*Markers, Chemiluminescence), Brightness, Colors, Emissivity, Performance (Engineering), Oxidizers, Gels, Thermal stability, Catalysis, Synthesis (Chemistry), Thermal properties, Impurities, Storage.
Identifiers: STELLER.

An investigation was initiated in order to anrwer critical questions concerning the chemical behavior of the STELLER chemiluminescent material pertinent to its use for night signalling and marking applications. STELLER is used in two-component chemiluminescent systems which emit light when the STELLER is mixed with the oxidizer (see AD-631 458). Performance modification to increase brightness at long durations was approached by controlling the rate of diffusion of the oxidizer ions to the STELLER in the reaction medium. The production of STELLER derivatives which emit light of various colors other than yellow was approached by substituting other acids for hydrochloric acid in the STELLER synthesis. Thermal stability was investigated by exposing STELLER to temperatures in the range from ambient to 167F for periods up to two months. Performance temperature range was determined by measuring the chemiluminescent performance of STELLER at temperatures from -40F to 125F. The effect of reactant purity was determined by synthesizing STELLER with reactants of various purities and measuring the variations in chemiluminescent performance.
AD-653 153 HC$3.00 MF$0.65

CARBIDE-GRAPHITE COMPOSITES,
Los Alamos Scientific Lab., N. Mex.
K. V. Davidson, R. E. Riley, and J. M. Taub. 14 Jul 66, 64p
Contract W-7405-eng-36

Descriptors: (*Carbides, Composite materials), (*Composite materials, Graphite).

For abstract, see NSA 21 02.
LA-3569-MS HC$3.00 MF$0.65

UNDERWATER DEGRADATION OF POLYETHYLENE FOR WIRE INSULATION.
Furukawa Electric Co., Ltd., Tokyo (Japan).
For primary bibliographic entry see Field 11I.
For abstract, see STAR 05 14.
N67-26801 HC$3.00 MF$0.65

11H. OILS, LUBRICANTS, AND HYDRAULIC FLUIDS

A STUDY OF OIL CIRCULATION IN THE R4 SPIN-AXIS BEARING WITH SINTERED NYLON BALL RETAINER,
Massachusetts Inst of Tech Cambridge Instrumentation Lab
Martin Roberts. Dec 66, 26p Rept no. E-2082
Contract AF 33 (615)-2243

Descriptors: (*Gyroscopes, Bearings), (*Ball bearings, *Lubrication), (*Lubricants, Tracer studies), Fluid flow, Dyes, Oils, Permeability, Diffusion.

A study was conducted on the circulation of lubricants in the R-4 spin-axis gyro bearing. The flow of lubricant was traced by incorporating 1% anthroquinone dye in the lubricant impregnated in an isolated portion of the sintered nylon retainer and periodically observing the color change of the undyed section as the lubricant was transported. Flow rates were determined for variations in speed, preload, bearing geometry, ambient pressure, lubricant viscosity and surface tension, retainer permeability, and the use of an antimigration barrier film. At 24,000 rpm and 7 pounds preload, an average circulation rate for Teresso V-78 was 45 micrograms/hour, which is equivalent to an average residence time of 2 hours on the metal raceways. The most important factor influencing circulation was the retainer permeability. (Author)
AD-652 843 HC$3.00 MF$0.65

A NUMERICAL SOLUTION OF THE ELASTOHYDRODYNAMIC FILM THICKNESS IN AN ELLIPTICAL CONTACT.
Technical rept.,
Mechanical Technology Inc Latham N Y
H. S. Cheng. May 67, 37p Rept no. MTI-67TR25
Contract N00014-66-C-0037

Descriptors: (*Lubrication, Hydrodynamics), (*Bearings, Films), Thickness, Numerical analysis, Elasticity, Lubricants, Ellipsoids.
Identifiers: Elastohydrodynamic lubrication.

A numerical solution of the elastohydrodynamic film thickness in an elliptical contact is developed. The three dimensional Reynolds equation in the inlet region is solved by a finite difference method. The deformation contour in the inlet region is calculated according to the classical Hertz theory for

elliptical contacts. Results are presented as side leakage film reduction factors, which are defined as the ratios of the film thickness of the finite contact to that calculated by a line contact theory based on the same maximum Hertz stress. The results obtained for b/a approaches infinity, which corresponds to a line contact, and for b/a = 1, which corresponds to a circular contact, agree with others. Comparison with experimental data indicates that the theory in the report predicts a film thickness slightly higher than those measured by the experiment. (Author)
AD-652 923 HC$3.00 MF$0.65

CALCULATION OF ELASTOHYDRODYNAMIC FILM THICKNESS IN HIGH SPEED ROLLING AND SLIDING CONTACTS.
Technical rept.,
Mechanical Technology Inc Latham N Y
H. S. Cheng. May 67, 106p Rept no. MTI-67TR24
Contract N00014-66-C-0037

Descriptors: (*Lubrication, Hydrodynamics), (*Bearings, Films), Thickness, Antifriction bearings, Thermal properties, Lubricants, Numerical analysis, Loading (Mechanics).
Identifiers: Elastohydrodynamic lubrication.

A Grubin type inlet film thickness analysis including the full thermal effects is developed. The temperature distribution in the inlet region where the reverse flow exists is calculated by a repetitive forward and backward marching procedure. Results are obtained for wide ranges of loads, speeds and lubricant parameters. These cover extremely high speed ranges for which no results were available previously. The reduction of film thickness due to thermal effects is accounted by a thermal reduction factor, which is defined as the ratio of the actual film thickness to that calculated by isothermal theories. Design charts are presented in terms of the thermal reduction factors. A design procedure to calculate film thickness for high speed, heavily loaded contacts is developed and two numerical examples are included. (Author)
AD-652 924 HC$3.00 MF$0.65

BEARING TORQUE AND FATIGUE LIFE STUDIES WITH SEVERAL LUBRICANTS FOR USE IN THE RANGE 500 DEG F TO 700 DEG F.
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
For primary bibliographic entry see Field 13I.
For abstract, see STAR 05 14.
N67-26543 HC$3.00 MF$0.65

11I. PLASTICS

UPGRADING OF POLYMERIC MATERIALS FOR ELECTRICAL APPLICATIONS.
Final rept., 2 Jul 62-15 Oct 64,
Radiation Applications, Inc., Long Island City, N. Y.
A. A. Benderly. 15 Oct 64, 81p RAI-339
Contract DA-49-186-502-ORD-1095

Descriptors: (*Electric insulation, Polymers), (*Polyethylene plastics, Crosslinking (Chemistry)), (*Crosslinking (Chemistry), *Radiation chemistry), Dielectrics, Thermal stability, Nuclear RADIATION, Dose rate, Additives, Fatty acid esters, Benzenes, Tensile properties, Modulus of elasticity, Creep, Brittleness.
Identifiers: Allyl methacrylates, Diallyl maleates, Divinyl benzenes, Polypropylenes.

The results are reported of a program which undertaken to (a) perform radiation crosslinking of polyethylene in the presence and absence of polyfunctional monomers, (esp. allyl methacrylate, diallyl maleate, divinyl benzene), (b) perform radiation crosslinking of polypropylene and an ethylene-propylene copolymer in the presence of such additives, (c) measure the mechanical and electrical properties of typical products obtained and (d) obtain information leading to the development of superior electrical materials by the radiation crosslinking process, and develop an understanding of the factors controlling the magnitude of such improvements.
AD-463 790 HC$3.00

PHOSPHONITRILIC FLUOROALKOXIDE POLYMERS,
English Electric Co., Ltd., Luton.
For primary bibliographic entry see Field 7C.
AD-643 548 HC$3.00 MF$0.65

INTERFACIAL INTERACTION IN COMPOSITE STRUCTURES.
Alpha Research and Development, Inc., Blue Island, Ill.
For primary bibliographic entry see Field 11D.
AD-644 219 HC$3.00 MF$0.65

THERMOGRAVIMETRY OF PHENOL-FORMALDEHYDE POLYCONDENSATES. PART II. EMPIRICAL KINETIC PARAMETERS.
Technical rept., May 65-Sep 66,
Air Force Materials Lab Wright-Patterson AFB Ohio
R. W. Farmer. Mar 67, 73p Rept no. AFML-TR-65-246-Pt-2
See also AD-646 897.

Descriptors: (*Heat shields, Phenolic plastics), (*Phenolic plastics, Thermogravimetric analysis), Thermochemistry, Mass spectroscopy, Computer programs, Thermal stability, Mechanical properties, Ablation, Reinforced plastics, Laminated plastics.
Identifiers: Ablative materials.

Empirical kinetic parameters for phenol-formaldehyde polycondensate materials were surveyed for general application to Air Force interests. The ranges of n, A, E for the empirical kinetic model - (dw/dt) = (w to the nth) A exp (-E/RT) were n = 0-5, A = 0.2 to 1.7 x 10 to the 16th power 1/min, E = 3.7-72kcal/mole, where w is normalized weight, t is time, R is gas constant, T is temperature. The mass spectrometry and thermogravimetry thermal analysis methods used both constant heating rate and isothermal approaches. Reexamination of data with a new computer program gave reduced variations: n = 1.56 plus or minus 0.07, A = 60.9 plus or minus 41.4, E = 10.38 plus or minus 1.20. The scopes of the comprehensive survey and descriptive thermogravimetry computer analysis were: (22 constant rate + 3 isothermal) vs 6 constant rate experiments by 8 vs 3 investigators using (5 cured + 7 vitreous fiber reinforced) vs 4 cured polycondensates. Parameter inconsistencies for the survey were partially associated with an atypical polycondensate, laminate and polycondensate particle or laminate powder samples, or a reduced pressure atmosphere. Calculated parameters apparently dependent upon the two latter aspects were not averaged with other values. Small curve-fitting and other errors potentially enhance further disagreement as they often gave large parameter variations. (Author)
AD-652 844 HC$3.00 MF$0.65

DILUTE SOLUTION PROPERTIES OF HIGH-MOLECULAR-WEIGHT POLY (ISOBUTYL METHACRYLATE). VIII. GEL PERMEATION CHROMATOGRAPHY.
Picatinny Arsenal Dover N J Feltman Research Labs
For primary bibliographic entry see Field 7D.
AD-652 879 HC$3.00 MF$0.65

PURIFICATION OF ORGANIC MATERIALS AND STUDY OF POLYMERS THEREFROM.
Minnesota Mining and Mfg Co St Paul Central Research Labs
For primary bibliographic entry see Field 7C.
AD-653 109 HC$3.00 MF$0.65

TESTING TECHNIQUES FOR FILAMENT REINFORCED PLASTICS. SYMPOSIUM HELD SEPTEMBER 21 TO 23, 1966 AT DAYTON, OHIO.
Air Force Materials Lab., Wright-Patterson AFB, Ohio.
For primary bibliographic entry see Field 11D.
AD-801 547 HC$3.00 MF$0.65

UNDERWATER DEGRADATION OF POLYETHYLENE FOR WIRE INSULATION.
Furukawa Electric Co., Ltd., Tokyo (Japan).
T. Fukuda, M. Hasebe, and T. Yoshida. 1966, 26p AD-646545
Presented At the 15th Ann. Wire and Cable Symp., Atlantic City, 7-9 Dec. 1966

Descriptors: *Degradation, *Electric wiring, *Insulation, *Polyethylene, *Underwater test, *Voltage, Coating, Conductor, Crack, Electric, Growth, Oxidation, Permeation, Plastic, Stress, Temperature, Test, Underwater, Wiring.

For abstract, see STAR 05 14.
N67-26801 HC$3.00 MF$0.65

MECHANICAL PROPERTIES OF EPOXY RESINS AND GLASS/EPOXY COMPOSITES AT CRYOGENIC TEMPERATURES.
Aerojet-general Corp., Azusa, Calif. Von Karman Center.
R. Molho, and L. M. Soffer. 1967, 68p NASA-CR-84451
Contract NAS3-6287
Its Contrib. No. 279

Descriptors: *Composite material, *Cryogenic temperature, *Epoxy resin, *Mechanical property, Bisphenol, Composite, Cryogenic, Epoxy, Filament, Glass, Hybrid, Impact, Material, Mechanical, Notch, Property, Resistance, Shock, Strength, Temperature, Tensile, Thermal, Winding.

For abstract, see STAR 05 14.
N67-27217 HC$3.00 MF$0.65

FOAM-IN-PLACE MATERIALS FOR HIGH VOLTAGE INSULATION IN A SPACE ENVIRONMENT.
TRW Systems Group, Redondo Beach, Calif.
R. J. Holbrook, and C. J. Holzbauer. Apr 67, 105p NASA-CR-72100, TRW-06378-6007-R000
Contract NAS3-8905

Descriptors: *Dielectric material, *Electric insulation, *High vacuum, *Polyurethane foam, *Space environment, Dc, Dielectric, Electric, Environment, Evaluation, Foam, High, High voltage, Insulation, Material, Mechanical, Permeability, Polyurethane, Property, Radiation, Space, Strength, Testing, Vacuum.

For abstract, see STAR 05 14.
N67-27228 HC$3.00 MF$0.65

11J. RUBBERS

PHOSPHONITRILIC FLUOROALKOXIDE POLYMERS,
English Electric Co., Ltd., Luton.
For primary bibliographic entry see Field 7C.
AD-643 548 HC$3.00 MF$0.65

11K. SOLVENTS, CLEANERS, AND ABRASIVES

VALID AND NON-VALID DIMENSIONAL ANALYSES OF THE DETERGENCY PROCESS.

Progress rept.,
Coating and Chemical Lab., Aberdeen Proving Ground, Md.
A. Mankowich. Oct 66, 44p CCL-211
See also AD-468 289.

Descriptors: (*Surface-active substances, Effectiveness), (*Cleaning compounds, Numerical analysis), Matrix algebra, Microstructure, Surface tension, Force (Mechanics), Test methods, Dipole moments, Viscosity, Concentration (Chemistry), Density.
Identifiers: Dimensional analysis, Biodegradable detergents.

Recent work at this laboratory on the application of dimensional analysis to the detergency process using commercial hard surfactants was further validated by data on twenty soil-surfactant systems in which the surfactants were commercial biodegradable nonionics. The previous validation was made more meaningful by re-calculations with CMC and surface tension values determined in this laboratory replacing the previously-used literature values of homogeneous materials. Dimensional analyses with detergency assigned the dimensions of work, M (L sq. XT sq.), and of force, ML/ (T sq.), as substitutes for the postulated ML (M=mass, L=length, T=time) could not be validated. The relevance of the variables comprising the valid dimensional analysis was enhanced by the non-validation of several dimensional analyses based on other groups of apparently critical process parameters. (Author)
AD-642 834 HC$3.00 MF$0.65

11L. WOOD AND PAPER PRODUCTS

FOREST PRODUCTS LABORATORY LIST OF PUBLICATIONS ON WOOD FINISHING SUBJECTS.
Forest Products Lab Madison Wis
For primary bibliographic entry see Field 11C.
AD-652 867 HC$3.00 MF$0.65

12. MATHEMATICAL SCIENCES

12A. MATHEMATICS AND STATISTICS

ASYMPTOTIC SOLUTIONS FOR THE EXPANSION OF GAS INTO VACUUM,
Ballistic Research Labs., Aberdeen Proving Ground, Md.
For primary bibliographic entry see Field 20D.
AD-465 240 HC$3.00 MF$0.65

SOME DEVELOPMENT OF MARKOFF'S METHOD OF RANDOM FLIGHTS, WITH THE INTENTION OF APPLICATION TO TURBULENT FLOW.
Polytechnic Inst. of Brooklyn, N. Y. Dept. of Aerospace Engineering and Applied Mechanics.
For primary bibliographic entry see Field 20D.
AD-477 798 HC$3.00 MF$0.65

DYNAMICAL SIMILARITIES IN RAREFIED GAS FLOWS.
Polytechnic Inst. of Brooklyn, N. Y. Dept. of Aerospace Engineering and Applied Mechanics.
For primary bibliographic entry see Field 20D.
AD-478 179 HC$3.00 MF$0.65

LOCAL BEHAVIOR OF STATIONARY GAUSSIAN PROCESSES,
RAND Corp., Santa Monica, Calif.
M. B. Marcus. Oct 66, 59p RM-5139-PR
Contract AF 49 (638)-1700

Descriptors: (*Information theory, *Statistical processes), Brownian motion, Probability.

The local behavior is found for a wide class of separable, stationary Gaussian processes. In most cases, the processes considered are those with covariances that are convex in (0, d) for some d > 0. Analogues are found to the well-known results for Brownian motion, the law of the iterated logarithm, and Paul Levy's uniform Holder condition. (Author)
AD-641 323 HC$3.00 MF$0.75

ON OUTSTANDING VALUES IN A SEQUENCE OF RANDOM VARIABLES,
Purdue Univ., Lafayette, Ind. Dept. of Statistics.
Mahabanoo N. Tata. Jan 67, 39p Mimeograph Series-97
Contract Nonr-1100 (26)

Descriptors: (*Random variables, *Sequences), Real numbers, Distribution functions, Inequalities, Series, Exponential functions, S tochastic processes.

The report considers a sequence (X sub n, n > or = 1) of independent, identically distributed and absolutely continuous random variables. X sub j is called an outstanding value in the sequence X sub n if X sub j > max (X sub 1, ... , X sub j - 1). By convention X sub 1 is outstanding. Let L sub 0 = 1 and n > or 1 define L sub n = min (j:j > L sub n-1, X sub j is outstanding), delta sub n = L sub n - L sub n-1.
AD-645 831 HC$3.00 MF$0.65

A SECOND ORDER, NON-LINEAR ELLIPTIC BOUNDARY VALUE PROBLEM WITH GENERALIZED GOURSAT DATA,
Maryland Univ College Park Inst for Fluid Dynamics and Applied Mathematics
A. K. Aziz, R. P. Gilbert, and H. C. Howard. 1966, 18p
Grants AF-AFOSR-400-64, NSF-GP-3937
Prepared in cooperation with Georgetown Univ., Washington, D. C.
Availability: Published in Annali di Matematica Pura ed Applicata v72 Ser4 p325-42 1966.

Descriptors: (*Boundary value problems, Theorems), (*Partial differential equations, *Mapping (Transformations)), Banach space, Complex variables, Set theory, Transformations (Mathematics), Integrals, Operators (Mathematics), Problem solving.

The case of generalized Goursat data is considered for the non-linear partial differential equation delta u = f (x, y, u, u sub x, u sub y). The existence and uniqueness of a solution is demonstrated, under certain conditions, by employing the contraction mapping method in a suitable Banach space.
AD-652 744 Not available from CFSTI.

ROLE OF THE INTEGRAL-OPERATOR METHOD IN THE THEORY OF POTENTIAL SCATTERING,
Maryland Univ College Park Inst for Fluid Dynamics and Applied Mathematics
For primary bibliographic entry see Field 20H.
AD-652 745 Not available from CFSTI.

THE RELATIONSHIPS AMONG SEQUENCES WITH APPLICATIONS TO GEOLOGICAL DATA.
Miami Univ Fla Inst of Marine Science
For primary bibliographic entry see Field 8G.
AD-652 766 Not available from CFSTI.

E-POINTS OF GAMES,
Princeton Univ N J Econometric Research Program
Ezio Marchi. 11 Jan 67, 5p
Research supported in part by ONR. Prepared in cooperation with Cuyo Univ., Argentina.
Availability: Published in Proceedings of the National Academy of Sciences v57 n4 p878-82 Apr 1967.

Descriptors: (*Game theory, Theory), Vector spaces, Topology, Behavior.

This brief note characterizes new concepts of strategy games. The next section is devoted to examining the concepts in an elementary way and to making some intuitive observations. First of all the introduction of E-positive equilibrium points, which are a generalization of equilibrium points, is considered. Thus, by using the first theorem concerning such a point, the existence of an Em-stable point is deduced. A more general result is formulated in the second theorem. The following section is concerned with extending the general result for games on real topological vector spaces. This formulation is realized by using Fan's technique. Finally in the latter section we note that closely related results can be obtained, by considering an idea of Nikaido-Isoda. (Author)
AD-652 786 Not available from CFSTI.

ON GENERALIZED FUNCTIONS.
APL library bulletin translations series,
Johns Hopkins Univ Silver Spring Md Applied Physics Lab
Saad K. Nasr. 11 Apr 67, 8p Rept no. TG-230-T516
TT-67-62060
Contract NOw-62-0604
Trans. of Uspekhi Matematicheskikh Nauk (USSR) v20 n4 (124) p163-5 1965.

Descriptors: (*Functional analysis, Mathematics), Sequences, Theorems, Inequalities, Convergence.

Let S sub lambda (x) = (K/lambda) exp (- lambda squared/lambda squared -x squared)) if the absolute value of x < lambda; otherwise, S sub lambda (x) = 0. S sub lambda dx = 1. The author defines a g-function as a series (phi sub n) of functions infinitely differentiable on the line such that limit as n approaches infinity, of (phi sub n) * S sub lambda (x) exists for every lambda > o, x > minus infinity but < + infinity. It is found that the g-functions are closely associated with the generalized functions of temple. (Author)
AD-652 819 HC$3.00 MF$0.65

THE MATHEMATICAL THEORY OF A STATIONARY QUEUE,
Rand Corp Santa Monica Calif
A. Ya. Khinchin. 23 May 67, 16p Rept no. LT-67-19
TT-67-62063
Trans. of Matematicheskii Sbornik (USSR) p73-84 1932.

Descriptors: (*Queueing theory, Mathematics), (*Telephone communication systems, Queueing theory), USSR, Telephone equipment, Probability, Operations research, Stochastic processes, Theory.

The case of a single channel is treateu under the assumption that the sequence of waiting times is stationary (in mean neither increasing nor decreasing) and the service times have an arbitrary distribution (with characteristic function psi (xi)). The relative lengths P (k) of the time intervals with k customers waiting is determined by recurrence formulas. Formula (5) gives the mean waiting time gamma; mu k signifies here the k-th moment of the distribution of waiting times and alpha denotes the traffic intensity. The formula for phi (xi) gives an expression for the characteristic function for

the waiting time distribution. Finally, formula (9) gives the variance of the waiting times.
AD-652 833 HC$3.00 MF$0.65

A THEOREM ON SPIN-EIGENFUNCTIONS.
Massachusetts Inst of Tech Lexington Lincoln Lab
For primary bibliographic entry see Field 20H.
AD-652 840 HC$3.00 MF$0.65

RANKING AND SELECTION PROCEDURES.
Final rept., Jul 63-Sep 66,
Purdue Univ Lafayette Ind Dept of Statistics
Shanti S. Gupta. Dec 66, 12p
ARL-66-0241
Contract AF 33 (657)-11737

Descriptors: (*Game theory, Selection), (*Multivariate analysis, Population (Mathematics)), Distribution theory, Random variables, Logistics, Documentation.

The report lists publications containing results of research on ranking and selection procedures for the univariate and multivariate populations. Also covers associated problems of distribution theory relevant to selection and ranking problems.
AD-652 847 HC$3.00 MF$0.65

HIGH SPEED DIGITAL FILTERING BY CONVOLUTION APPROXIMATION.
Aerospace Medical Research Labs Wright-Patterson AFB Ohio
For primary bibliographic entry see Field 9B.
AD-652 856 HC$3.00 MF$0.65

A MACHINE-INDEPENDENT THEORY OF THE COMPLEXITY OF RECURSIVE FUNCTIONS.
Doctoral thesis,
Massachusetts Inst of Tech Cambridge Research Lab of Electronics
Manuel Blum. Jun 66, 16p
Contract DA-36-039-AMC-3200 (E), Grant NSF-GP-2495
Revision of manuscript submitted Oct 1965.
Availability: Published in Journal of the Association for Computing Machinery v14 n2 p322-36 Apr 1967.

Descriptors: (*Recursive functions, Theory), Functions, Mathematics, Theses, Computer programs.

The number of steps required to compute a function depends, in general, on the type of computer that is used, on the choice of computer program, and on the input-output code. Nevertheless, the results obtained in this paper are so general as to be nearly independent of these conriderations. A function is exhibited that requires an enormous number of steps to be computed, yet has a 'nearly quickest' program: Any other program for this function, no matter how ingeniously designed it may be, takes practically as many steps as this nearly quickest program. A different function is exhibited with the property that no matter how fast a program may be for computing this function another program exists for computin the function very much faster. (Author)
AD-652 901 Not available from CFSTI.

TRANSFER PRICING IN A DECENTRALIZED FIRM: A DECOMPOSITION ALGORITHM FOR QUADRATIC PROGRAMMING.
Research rept.,
Carnegie Inst of Tech Pittsburgh Pa Management Sciences Research Group
Jerome E. Hass. May 67, 41p Rept no. RR-93
Contract Nonr-760 (24)

Descriptors: (*Quadratic programming, Algorithms), Real time, Decision making, Management engineering, Economics, Costs, Commerce, Linear programming, Production.

A discussion of the importance of transfer pricing and a review of the relevant literature are followed by a decomposition algorithm for quadratic programming, using the problem of transfer pricing with externalities as a vehicle for its development. A numerical example is given and comments are made of the applicability and behavioral implications of adoption in a real time context.
AD-652 916 HC$3.00 MF$0.65

THE COMPUTATION OF BOUNDS FOR THE INVARIANT SUBSPACES OF A GENERAL MATRIX OPERATOR.
Technical rept.,
Stanford Univ Calif Dept of Computer Science
James M. Varah. 26 May 67, 246p Rept no. CS-66
Contract Nonr-225 (37)

Descriptors: (*Matrix algebra, Mathematics), Perturbation theory, Theses, Computer programs, Errors, Transformations (Mathematics), Approximation (Mathematics), Mathematical analysis, Theory.

Let A be a general n x n complex matrix. We consider the problem of finding the invariant subspaces of A, i.e. solving AX = XM for X nonsingular and M block-diagonal. We first consider finding the eigensystem of A (i.e. M diagonal), assuming approximations to the eigenvalues are given. We show how to find approximate eigenvectors and rigorous machine bounds for the errors in the approximate eigensystem. Then we show how to find approximations and rigorous error bounds for higher-dimensional invariant subspaces of matrices w iich are close, in a sense we describe, to defective matrices, and for which poor results would be obtained for the eigensystem. Burroughs B5500 Extended Algol programs using these methods are also given. (Author)
AD-652 921 HC$3.00 MF$0.65

COMPUTATIONAL CONSIDERATIONS REGARDING THE CALCULATION OF CHEBYSHEV SOLUTIONS FOR OVERDETERMINED LINEAR EQUATION SYSTEMS BY THE EXCHANGE METHOD
Technical rept.,
Stanford Univ Calif Dept of Computer Science
Richard H. Bartels, and Gene H. Golub. 2 Jun 67, 67p Rept no. CS-67
Contract Nonr-225 (37)

Descriptors: (*Equations, Minimax technique), Algorithms, Theory, Matrix algebra, Mathematics.

An implementation, using Gaussian LU decomposition with row interchanges, of Stiefel's exchange algorithm for determining a Chebyshev solution to an overdetermined system of linear equations is presented. The implementation is computationally more stable than those usually given in the literature. A generalization of Stiefel's algorithm is developed which permits the occasional exchange of two equations simultaneously. Finally, some experimental comparisons are offered. (Author)
AD-652 922 HC$3.00 MF$0.65

A NOTE ON PROBLEMS WITH PERIODIC TARGET SETS,
New York Univ N Y Dept of Electrical Engineering
M. Klop, and P. Sarachik. 29 Jul 66, 2p
AFOSR-67-1238
Grants AF-AFOSR-747-65, AF-AFOSR-747-66
Availability: Published in IEEE Transactions on Automatic Control vAC12 n1 p104-5 Feb 1967.

Descriptors: (*Optimization, Control), Hamiltonian, Boundary value problems, Differential equations, Equations of state.
Identifiers: Maximum principle.

For certain types of optimization problems, the target set may consist of an infinite number of points uniformly spaced along one or more of the state variable axes. Since the target set is noncompact, the maximum principle cannot be applied directly. However, a new set of state variables can be defined which eliminates this problem. The single-axis attitude control problem will be solved to demonstrate the method. (Author)
AD-652 932 Not available from CFSTI.

A NOTE ON EQUILATERAL METRIC TRIPLES,
California Univ Riverside
B. W. Huff, and W. A. Kirk. Mar 67, 8p
AROD-3574:2
Grant DA-ARO (D)-31-124-G383
Availability: Published in American Mathematical Monthly v74 n3 p288-90 Mar 1967.

Descriptors: (*Topology, Theory), Inequalities, Mathematics.

Let M denote a metric space and S (a,b) a metric segment of M with end-points a,b. A point f of S (a,b) is said to be a foot of pEM on S (a,b) if pf=inf (px:xES (a,b)). The following result is from the literature (L. M. Blumenthal, theory and applications of distance geometry, Clarendon Press, Oxford, 1953; p47): (1) If f is a foot of p on S (a,b) and if min (af,bf)>3pf>0, then there exist points q and r of S (a,b) such that p, q, r from an equilateral triple (pq=qr=pr). This observation is used to characterize the metric segment among all closed, compact and convex metric spaces (which contain at least two points) by the absence of equilateral triples. It is natural to ask whether 3 is the smallest multiplier of pf for which (1) is valid. In this note we sharpen (1) by showing that the number 3 of (1) may be replaced by 2 in general (i.e., if f is merely assumed to be any point of S (a,b)), and by 1 if f is a foot of p on S (a,b). These numbers are the best possible.
AD-652 959 Not available from CFSTI.

GAUGE PROPERTIES OF THE MINKOWSKI SPACE,
Princeton Univ N J Palmer Physical Lab
For primary bibliographic entry see Field 20K.
AD-652 961 Not available from CFSTI.

DISTRIBUTIONS ASSOCIATED WITH THE QUADRIVARIATE NORMAL,
Columbia Univ New York Electronics Research Labs
K. S. Miller, and Harold Sackrowitz. 1965, 17p
AROD-5132:3
Contract DA-31-124-ARO (D)-255
Availability: Published in Journal of the Industrial Mathematics Society, v15 Pt2 p1-14 1965.

Descriptors: (*Functional analysis, *Statistical processes), Theorems, Determinants, Random variables, Bessel functions, Integrals.

Let Y be a vector function of a Gaussian random vector X. Under various hypotheses the density function of Y is found - mostly in closed form - in terms of higher transcendental functions. In particular if the components of Y are homogeneous in the components of X, then the density function of Y may be found (in closed form) under very mild assumptions.
AD-652 964 Not available from CFSTI.

SOME MULTIDIMENSIONAL DISTRIBUTIONS BASED ON A STATIONARY GAUSSIAN MARKOV PROCESS (DISCRETE PARAMETER),
Columbia Univ New York Electronics Research Labs
Pi-Erh Lin. 1965, 18p
AROD-5132:5
Contract DA-31-124-ARO (D)-255

Availability: Published in Journal of the Industrial Mathematics Society, v15 Pt2 p33-47 1965.

Descriptors: (*Statistical processes, Vector spaces), Functions, Matrix algebra, Mathematics, Theor., Transformations (Mathematics), Transcendental functions, Distribution theory.
Identifiers: Density functions.

Let X1, X2, ..., Xp be identically, but not independently, normally distributed n-dimensional vectors, each of which has mean zero and covariance matrix sigma (superscript 2)I. Under various assumptions, joint density functions of these vectors have been obtained in terms of higher transcendental functions. (Author)
AD-652 965 Not available from CFSTI.

ON GAUSSIAN MEASURES EQUIVALENT TO WIENER MEASURE II,
Hamline Univ St Paul Minn
Dale E. Varberg. 15 Dec 65, 21p
AFOSR-67-1194
Grant AF-AFOSR-35-65
Prepared in cooperation with Institute for Advanced Study, Princeton, N. J.
Availability: Published in Mathematica Scandinavica v18 p143-60 1966.

Descriptors: (*Measure theory, *Probability), Transformations (Mathematics), Integral equations, Mathematics, Theory.
Identifiers: Wiener measure.

Let P tau be a Gaussian probability measure determined by a covariance function tau (s,t) but note that we are assuming the mean function to be zero). Similarly, let Pw sigma denote the familiar Wiener measure determined by the covariance function w sigma (s,t)=sigma 2 min (s,t). This paper demonstrates simple and easily checked conditions on tau which guarantee that P tau and Pw sigma are equivalent (mutually absolutely continuous with respect to each other).
AD-652 970 Not available from CFSTI.

ON THE ASYMPTOTIC BEHAVIOR OF SPECTRAL FUNCTIONS AND RESOLVENT KERNELS OF ELLIPTIC OPERATORS.
Doctoral thesis.
Hebrew Univ Jerusalem (Israel)
Shmuel Agmon, and Yakar Kannai. 1 Mar 67, 32p
AFOSR-67-1191
Grant AF-EOAR-18-66
Prepared in cooperation with Israel Institute for Biological Research.
Availability: Published in Israel Journal of Mathematics v5 n1 30p Jan 1967.

Descriptors: (*Operators (Mathematics), *Hilbert space), (*Differential equations, Theorems), Functions, Israel, Transformations (Mathematics), Asymptotic series, Theorems, Sequences, Integrals.

Asymptotic formulas with remainder estimates are derived for spectral functions of general elliptic operators. The estimates are based on asymptotic expansion of resolvent kernels in the complex plane.
AD-652 974 Not available from CFSTI.

DYNAMICAL THEORY OF STRONG INTERACTIONS,
Yeshiva Univ New York Belfer Graduate School of Science
For primary bibliographic entry see Field 20H.
AD-652 976 Not available from CFSTI.

AN ABSTRACT VARIATIONAL THEORY WITH APPLICATIONS TO A BROAD CLASS OF OPTIMIZATION PROBLEMS, II,
University of Southern California Los Angeles Dept of Electrical Engineering
Lucien W. Naustadt. 1 Jun 66, 51p
AFOSR-67-1202
Grant AF-AFOSR-1029-66
Availability: Published in J. SIAM Control v5 n1 p90-137 1967.

Descriptors: (*Optimization, Mathematics), Functions, Differential equations, Approximation (Mathematics), Theory.
Identifiers: Variational theory.

In this article the general necessary conditions for variational problems obtained in Part I are specialized to a number of particular problems. These problems include all of the important optimal control problems, both with and without restricted phase coordinates, problems arising from quasiconvex families of functions, and discrete optimal control problems of various types. The necessary conditions obtained include, as special cases, the Pontryagin maximum principle and its various extensions and generalizations, as well as the associated transversality conditions. (Author)
AD-652 983 Not available from CFSTI.

ON TESTING CORRELATION MATRICES,
George Washington Univ Washington D C
S. Kullback. 1967, 8p
AFOSR-67-1205
Grant AF-AFOSR-932-05
Availability: Published in Applied Statistics v16 n1 p80-5 1967.

Descriptors: (*Correlation techniques, *Statistical functions), Sampling, Mathematics, Theory.

Procedures and illustrative examples are given to test a null hypothesis specifying the population correlation matrix and the homogeneity of several independent sample correlation matrices. (Author)
AD-652 987 Not available from CFSTI.

POLAR SETS AND REMOVABLE SINGULARITIES OF PARTIAL DIFFERENTIAL EQUATIONS,
Minnesota Univ Minneapolis Dept of Mathematics
Walter Littman. Aug 65, 11p
AFOSR-67-1210
Grant AF-AFOSR-883-65
Availability: Published in Arkiv foer Matematik v7 n1 p1-9 1967.

Descriptors: (*Partial differential equations, Theory), Functions, Equations, Mathematics.

A certain capacity M sub m,q (s) measuring the size of a compact set s is introduced. If L is a linear partial differential operator of order m it is shown that if Lu = 0 in a domain with the set s removed and it belongs to Lp then it can be redefined in s so as to satisfy Lu=0 in the whole domain, provided M sub m,q (s) = 0, where 1/p + 1/q = 1. If L is elliptic this condition is also necessary. If the set s has dimension (appropriately defined) n-mq or less (where n is the dimension of the underlying space in which the domain is situated) then it is shown that M sub m,q (s) = 0, and the above mentioned result applies. Better results are obtained for equations having a special form. These are illustrated, for the heat equation, in detail. (Author)
AD-652 988 Not available from CFSTI.

ANALYTICAL METHODS IN PROBABILITY THEORY,
Catholic Univ of America Washington D C
Eugene Lukacs. 17 May 67, 35p
AFOSR-67-1190
Grant AF-AFOSR-437-65
Availability: Published in Lecture Notes in Mathematics Volume 31, Symposium on Probability Methods in Analysis, Berlin p208-38 1967.

Descriptors: (*Probability, Theory), (*Distribution functions, Mathematics), Equations, Differential equations, Statistical functions, Factor analysis, Analytic functions, Integral transforms.

A number of probabilistic problems is discussed, the solution of which calls for the use of analytical methods. A survey of these topics in connection with the present course is motivated by the fact that many of these probabilistic problems stimulated analytical investigations. Some of these do not admit a probabilistic interpretation. The first part of the paper centers around the concept of positive definiteness. The discussion of the theorem of Marcinkiewicz and its generalizations are followed by the study of the positive definite solutions of certain differential and functional equations. The extension problem for positive definite functions, the study of positive definite functions on groups and of functions operating on positive definite functions are analytical problems stimulated by these probabilistic studies. The second part of the paper deals primarily with the arithmetic of distribution functions. The problem of multiple factorizations and the decomposition of the convolution of a Normal and a Poissonian distribution are treated in some detail. As examples of related analytical problems certain decompositions of the Fourier transforms of functions of bounded variation and also alpha-decompositions are mentioned. (Author)
AD-652 991 Not available from CFSTI.

SOLVING BICRITERION MATHEMATICAL PROGRAMS,
California Univ Los Angeles Western Management Science Inst
Arthur M. Geoffrion. 14 Mar 66, 20p Rept no. WMSI Reprint-40
Contract Nonr-233 (75)
Prepared for presentation at National Meeting of the Operations Research Society of America (29th) held in Santa Monica, Calif., 20 May 1966.
Availability: Published in Operations Research v15 n1 p39-54 Jan-Feb 1967.

Descriptors: (*Mathematical programming, Theory), Equations, Algorithms, Optimization, Mathematics, Numerical methods and procedures.

It often happens in applications of mathematical programming that there are two incommensurate objective functions to be extremized, rather than just one. One thus encounters bicriterion programs of the form of equation (1), maximize (subscript x, epsilon, X) h (f1 (x), f2 (x)), where h is an increasing utility function, preferably quasiconcave, defined on outcomes of the concave objective functions f1 and f2, and x is a decision n-vector constrained to the convex set X. It is shown how such programs can be numerically solved if a parametric programming algorithm is available for the parametric subproblem maximize (subscript x, epsilon, X) alpha f1 (x) + (1-alpha) f2 (x), (0 = or < alpha = or < 1) A natural byproduct of the calculations is a relevant portion of the 'tradeoff curve' between f1 and f2. Outlines of several algorithms for solving equation (1) under various special assumptions and a numerical example are presented to illustrate the application of the theory developed herein. A useful extension is presented that permits nonlinear scale changes to be made on the fi. (Author)
AD-653 000 Not available from CFSTI.

AN ALGORITHM FOR OBTAINING SOLUTIONS TO LAPLACE'S TIDAL EQUATIONS,
Atmospheric Sciences Lab White Sands Missile Range N Mex
J. Q. Longyear. Mar 67, 32p
ECOM-5113

Descriptors: (*Algorithms, *Partial differential equations), (*Tides, *Flow charting), Computers, Earth (Planet), Rotation, Acceleration, Gravity, Meteorology, Atmospheric tides, Atmospheric motion.

An algorithm, suitable for use on most computers, for obtaining solutions to Laplace's tidal equations for tides of longitudinal wave number one and of arbitrary period is described. Relevant proofs are included and a comparison is made between the equivalent depths found by this method and by those of Kato and Lindzen. A computer flow chart for the basic program is also given.
AD-653 002 HC$3.00 MF$0.65

STRICTLY CONCAVE PARAMETRIC PROGRAMMING. PART I. BASIC THEORY. PART II. ADDITIONAL THEORY AND COMPUTATIONAL CONSIDERATIONS.
California Univ Los Angeles Western Management Science Inst
For primary bibliographic entry see Field 12B.
AD-653 008 Not available from CFSTI.

NONEXPANSIVE AND MONOTONE MAPPINGS IN BANACH SPACES.
Lecture notes,
Brown Univ Providence R I Center for Dynamical Systems
Zdzislaw Opial. Jan 67. 134p Rept no. CDS-LN-67-1
AROD-5145:28-M
Contract DA-31-124-ARO (D)-270, Grant NGR-40-002-015
Prepared in cooperation with Jagellonian Univ. (Poland).

Descriptors: (*Banach space, *Mapping (Transformations)), Poland, Convex sets, Theorems, Functional analysis, Convergence, Approximation (Mathematics), Inequalities, Hilbert space.

This is a collection of lecture notes on Nonexpansive and Monotone Mappings in Banach Spaces.
AD-653 012 HC$3.00 MF$0.65

SOME STABILITY THEOREMS FOR ORDINARY DIFFERENCE EQUATIONS.
Technical rept.,
Brown Univ Providence R I Center for Dynamical Systems
James Hurt. Dec 66, 40p Rept no. CDS-TR-66-6
AROD-5145:29-M
Contracts DA-31-124-ARO (D)-270, NAS8-11264

Descriptors: (*Difference equations, *Theorems), (*Differential equations, Stability), Invariance, Convergence, Iterations, Errors, Operators (Mathematics), Sequences, Functions, Set theory.

LaSalle and others have developed a generalization of the 'second method' of Liapunov which utilizes certain invariance properties of solutions of ordinary differential equations. Invariance properties of solutions of ordinary difference equations are utilized here to develop stability theorems similar to those in LaSalle. As illustrations of the application of these theorems, a region of convergence is derived for the Newton-Raphson and Secant iteration methods. A modification of one of these theorems is given and applied to study the effect of roundoff errors in the Newton-Raphson and Gauss-Seidel iteration methods.
AD-653 013 HC$3.00 MF$0.65

THE DISTRIBUTION OF EDDY VELOCITIES AND TEMPERATURE FLUCTUATIONS IN THE FIRST 100 METERS.
Army Electronics Command Fort Huachuca Ariz Research Div
For primary bibliographic entry see Field 4B.
AD-653 016 HC$3.00 MF$0.65

GRAVITATIONAL RADIATION FROM NEUTRON STARS,
Columbia Univ New York
For primary bibliographic entry see Field 3A.
AD-653 048 Not available from CFSTI.

A NEW APPROACH TO THE THEORY OF MONADS.
Technical rept.,
California Inst of Tech Pasadena Dept of Mathematics
W. A. J. Luxemburg. Apr 67, 124p Rept no. TR-1
Contract N00014-66-C-0009-A04

Descriptors: (*Model theory, *Topology), (*Set theory, Theorems), Real numbers, Mapping (Transformations), Algebras, Banach space, Convergence, Sequences, Operators (Mathematics), Hilbert space.

The paper deals with the general theory of monads and its applications. In its general context the theory is part of non-standard analysis. Many new results concerning the notion of monad of a family are given. Furthermore it is shown that for a detailed description of a monad, saturated models are more appropriate than enlargements. As one of the many applications it is shown that the standard part of any internal set in a saturated model of a topological space is closed.
AD-653 070 HC$3.00 MF$0.65

REDUCED POWERS OF THE REAL NUMBER SYSTEM AND EQUIVALENTS OF THE HAHN-BANACH EXTENSION THEOREM.
Technical rept.,
California Inst of Tech Pasadena Dept of Mathematics
W. A. J. Luxemburg. Apr 67. 32p Rept no. TR-2
Contract N00014-66-C-0009-A04

Descriptors: (*Functional analysis, Theorems), (*Real numbers, *Algebras), Set theory, Mapping (Transformations), Rings (Mathematics), Topology, Banach space, Model theory, Convex sets, Sequences.

One of the main principles of functional analysis is the so-called Hahn-Banach extension theorem. In the present paper we are mainly interested in the question which other statements in mathematics can be shown to be effectively equivalent to the Hahn-Banach extension theorem. The main result can be phrased as follows: The Hahn-Banach extension theorem is effectively equivalent to the statement every non-degenerate Boolean algebra admits a non-trivial measure. The method being used is to consider the linear ring of finite elements in a reduced power of the real number system. It is shown that this linear ring is an abstract M-space in the sense of Kakutani. Some of the consequences of this fact are given in the present paper.
AD-653 071 HC$3.00 MF$0.65

ON SOME PROPERTIES OF BOUNDED INTERNAL FUNCTIONS.
Technical rept.,
California Inst of Tech Pasadena Dept of Mathematics
R. F. Taylor. May 67, 10p Rept no. TR-3
Contract N00014-66-C-0009-A04

Descriptors: (*Measure theory, *Functions), (*Number theory, Mathematics), Theorems, Convergence, Analysis.
Identifiers: Non-standard analysis, Internal functions.

Let R be the real number system and let R* be an ultrapower of R which is an enlargement of R. If omega is an infinitely large natural number, then the following bounded internal functions sin x omega, x epsilon R* are considered. It is shown that the function f sub omega (x) = (sin omega x), x epsilon R is either sin ax for some a or is unmeasurable. Arithmetical conditions for omega are given in order that f sub omega is not measurable. It is also shown that there exists an infinitely large natural number omega such that sin omega x does not equal 0 but f sub omega identically equals 0. An application to integration theory is given.
AD-653 072 HC$3.00 MF$0.65

RATIONAL STRUCTURE OF FORMULAS FOR CALCULATING THE STATISTICAL CHARACTERISTICS OF WAVE LOADS,
Naval Ship Systems Command Washington D C
For primary bibliographic entry see Field 13J.
AD-653 082 HC$3.00 MF$0.65

QUARTERLY STATUS REPORT NO. 105, 1 JANUARY THROUGH 31 MARCH 1967.
Stanford Univ Calif Stanford Electronics Labs
For primary bibliographic entry see Field 20I.
AD-653 095 HC$3.00 MF$0.65

ASSOCIATION IN A CLASS OF GROWTH,
Weather Squadron (3rd) Pope AFB N C Detachment 20
For primary bibliographic entry see Field 5J.
AD-653 099 HC$3.00 MF$0.65

LIKELIHOOD RATIO TESTS FOR RESTRICTED FAMILIES,
California Univ Berkeley Operations Research Center
For primary bibliographic entry see Field 12B.
AD-653 104 HC$3.00 MF$0.65

THE WIENER-HOPF SOLUTION OF THE OPTIMAL FIXED POINT SMOOTHING PROBLEM.
Technical rept.,
Northwestern Univ Evanston Ill Information-Processing and Control Systems Lab
James S. Meditch. Jun 67, 22p Rept no. TR-67-111
Contract N00014-67-A-0356-0003

Descriptors: (*Linear systems, Algorithms), Integral equations, Measurement, Differential equations, Matrix algebra.
Identifiers: Optimal data smoothing.

The algorithm for optimal fixed point data smoothing for continuous linear systems is developed by solving the appropriate Wiener-Hopf matrix integral equation in the time domain. Two formulations are given for generating the optimal smoothing filter gain matrix, and three matrix ordinary linear differential equations whose solutions yield the smoothing error covariance matrix are derived. The results substantiate and extend those obtained by the author earlier via another method. (Author)
AD-653 108 HC$3.00 MF$0.65

THE LEARNING BEHAVIOR AND ERGODIC PROPERTY OF FINITE-STATE MARKOV CHAINS.
Ohio State Univ Research Foundation Columbus
For primary bibliographic entry see Field 5J.
AD-653 116 HC$3.00 MF$0.65

COMPUTING TWO-COMMODITY FLOWS,
Virginia Univ Charlottesville
B. Rothschild, A. Whinston, and J. Kent. Apr 67. 13p
Contract Nonr-4811 (00), Grant NSF-GS-1359
Prepared in cooperation with California Univ., Los Angeles. Western Management Science Inst., Working Paper-115.

Descriptors: (*Minimax technique, Computers), Algorithms, Theorems, Networks, Operations research, Flow charting.

In a max-flow min-cut theorem for two-commodity flows in Euler networks with integer capacities is proved. The paper describes an algorithm for constructing maximal two-commodity integer flows based on proof and computation times for some exam les on a Burroughs B-5000 computer are given.
AD-653 117 HC$3.00 MF$0.65

FUNCTION APPROXIMATION BY A POLYGONAL CURVE,
Ballistic Research Labs Aberdeen Proving Ground Md
Clinton M. Frank, and Ralph E. Shear. Apr 67, 27p Rept no. BRL-1363

Descriptors: (*Functions, *Approximation (Mathematics)), (*Least squares method, *Curve fitting), Digital computers, Simulation, Analog computers, Mathematics.

A dynamic programming formulation of least squares approximation of a function by continuous, piecewise linear functions is presented. Computation results include the determination of slopes and break points of the polygonal approximating curve. The results are useful for function generation on analog and digital computers. (Author)
AD-653 140 HC$3.00 MF$0.65

POSITION FROM ANGLE MEASUREMENT.
Army Test and Evaluation Command White Sands Missile Range N Mex Deputy for National Range Engineering
For primary bibliographic entry see Field 16B.
AD-653 152 HC$3.00 MF$0.65

STATISTICAL CONSIDERATIONS IN COMPUTER SIMULATION EXPERIMENTS,
Rand Corp Santa Monica Calif
For primary bibliographic entry see Field 12B.
AD-653 174 HC$3.00 MF$0.65

THE ANALYSIS OF NOISY NON-LINEAR DEVICES BY MEANS OF GENERALIZED RANDOM PROCESSES,
Aerospace Research Labs Wright-Patterson AFB Ohio
For primary bibliographic entry see Field 20A.
AD-653 182 HC$3.00 MF$0.65

STUDIES IN RESEARCH METHODOLOGY. VII. THE CENTRAL LIMIT EFFECT FOR TWO DOZEN POPULATIONS AND ITS CORRELATION WITH POPULATION MOMENTS.
Final rept., Dec 64-Oct 66,
Aerospace Medical Research Labs Wright-Patterson AFB Ohio
James V. Bradley. Dec 66, 88p Rept no. AMRL-TR-66-242
See also AD-612 886.

Descriptors: (*Statistical tests, Theory), (*Population (Mathematics), Sampling), Statistical analysis, Psychology, Human engineering, Correlation techniques.

The report shows the Central Limit Effect upon the sample mean for samples from each of 24 populations. The exact shape of each population is shown graphically and its standardized central moments are given. Along with each population is shown the nonrobustness of its sample mean at both left and right tailed nominal alpha's of .50, .40, .30, .20, .10, .05, .025, .01, .005, .001, and .0005 for N's of 2, 4, 8, 16, 32, 64, 128, 256, 512, and 1024, thus depicting the Central Limit Effect in considerable detail. It is shown that the nonrobustness of the sample mean is strongly correlated with the departure of the 3rd and 4th standardized central moments of the sampled populations from their values for a normal distribution. When the population is appreciably asymmetric, the correlation with the 3rd moment tends to be extremely strong, especially when N is moderately large. (Author)
AD-653 189 HC$3.00 MF$0.65

GRAPHICS.
Massachusetts Inst of Tech Lexington Lincoln Lab
For primary bibliographic entry see Field 9B.
AD-653 191 HC$3.00 MF$0.65

LINEAR SOLUTIONS OF THE GEODETIC BOUNDARY-VALUE PROBLEM,
Ohio State Univ Columbus Dept of Geodetic Science
For primary bibliographic entry see Field 8E.
AD-653 193 HC$3.00 MF$0.65

SOME RESULTS CONCERNING THE ZERO-CROSSINGS OF GAUSSIAN NOISE.
Revised ed.,
California Univ Berkeley Dept of Electrical Engineering
E. Wong. 31 Jan 66, 11p
AROD-5177:3
Grants AF-AFOSR-139-65, DA-ARO (D)-31-124-G576
Revision of manuscript submitted 26 Jul 65.
Availability: Published in SIAM Journal of Applied Mathematics v14 n6 p1246-54 Nov 1966.

Descriptors: (*Statistical processes, Mathematics), Brownian motion, Integral equations, Theory, Probability.
Identifiers: Covariance function.

Let x (t) be a zero-mean stationary Gaussian process, with covariance function of the form (1). Ex (t)x (t+tau) = rho (tau) = 1 - (tau squared)/2 + (a/6) (absolute value of tau, cubed) + 0 (tau to the fourth power). Let xi be a random variable denoting the interval between two successive zeros of x (t). This paper gives some explicit results concerning a zero-mean Gaussian process with covariance function that is a special case of (1), (a = 4/ the square root of 3).
AD-653 224 Not available from CFSTI.

BIBLIOGRAPHY: GRAPH THEORY AND COMBINATORIAL THEORY.
Final rept.,
Michigan Univ Ann Arbor
Frank Harary. 1 May 67, 5p
AFOSR-67-1167
Grant AF-AFOSR-754-65

Descriptors: (*Graphics, *Combinatorial analysis), (*Bibliographies, Documentation), Topology, Theses, Reports, Scientific research.

Report lists all papers prepared under the sponsorship of the AFOSR grant. Many of the papers are on topological graph theory and the combinatorial enumeration theory.
AD-653 226 HC$3.00 MF$0.65

A SUFFICIENT CONDITION FOR CONJUGACY OF METRIC AUTOMORPHISMS,
Virginia Univ Charlottesville
N. F. G. Martin. 13 Sep 65, 17p
AROD-5306:9
Grant DA-ARO (D)-31-124-G662
Availability: Published in Transactions of the American Mathematical Society v125 n2 p238-49 Nov 1966.

Descriptors: (*Topology, Mathematics), Theorems, Theory, Algebraic geometry.
Identifiers: Subalgebras.

In this paper we take an idea of Rota's and define a 'universal' metric automorphism on a product space such that if T is any metric automorphism of one of the factor spaces there is an invariant subalgebra of the domain of the universal automorphism such that the universal automorphism restricted to this subalgebra is conjugate to T. Those subalgebras in the domain of the universal automorphism which are associated with some metric automorphism on the factor space are characterized. Using these subalgebras it is possible to define a function h on the cartesian product of the group of all metric automorphisms of a given measure algebra with itself to the real numbers such that if T and S are conjugate automorphisms then h (T,S) =0.
AD-653 232 Not available from CFSTI.

REDUCED TEICHMULLER SPACES,
Institute for Advanced Study Princeton N J
C. J. Earle. 3 Jan 66, 14p
AROD-3951:30
Grants DA-ARO (D)-31-124-G455, NSF-GP-2439
Availability: Published in Transactions of the American Mathematical Society v126 n1 p54-63 Jan 1967.

Descriptors: (*Transformations (Mathematics), *Topology), Complex variables, Functions, Mapping (Transformations), Mathematics, Theory.
Identifiers: Teichmuller space.

This paper falls naturally into three parts. In the first, we define and study the reduced Teichmuller space T* (Gamma) of a normalized Fuchsian group Gamma. For a group Gamma of the first kind, T* (Gamma) coincides with the Teichmuller space T (Gamma), and our results are for the most part restatements of results of Bers. In the second part of the paper, we study the finite dimensional spaces T* (Gamma). We show in particular that T* (Gamma) has finite dimension if and only if Gamma is finitely generated. In the final section, we study the reduced Teichmuller space of a Riemann surface.
AD-653 235 Not available from CFSTI.

ON FREE ALTERNATIVE RINGS,
Syracuse Univ N Y Dept of Mathematics
Margaret M. Humm, and Erwin Kleinfeld. Apr 67, 8p
AROD-3901:10
Contract DA-31-124-ARO (D)-36
Availability: Published in Journal of Combinatoral Theory v2 n2 p140-4 Apr 1967.

Descriptors: (*Rings (Mathematics), Numerical methods and procedures), Algebra, Theorems.

An example is presented that answers in the negative the question of whether the square of every commutator need always lie in the nucleus. Also, we show the existence of specific nilpotent elements in the free alternative ring on four or more generators, and prove abstractly the existence of an ideal I does not equal 0, and I2 = 0.
AD-653 245 Not available from CFSTI.

THE POST-NEWTONIAN EFFECTS OF GENERAL RELATIVITY ON THE EQUILIBRIUM OF UNIFORMLY ROTATING BODIES. III. THE DEFORMED FIGURES OF THE JACOBI ELLIPSOIDS. IV. THE ROCHE MODEL,
Chicago Univ Ill
For primary bibliographic entry see Field 20D.
AD-653 251 Not available from CFSTI.

THE UNIQUENESS OF SOLUTIONS OF THE HEAT EQUATION IN AN INFINITE STRIP.
Revised ed.,
California Univ Riverside
Victor L. Shapiro. 13 May 66, 40p
AFOSR-67-1276
Grant AF-AFOSR-694-64
Revision of manuscript submitted 10 Apr 65.

Availability: Published in Transactions of the American Mathematical Society v125 n2 p326-61 Nov 1966.

Descriptors: (*Partial differential equations, Boundary value problems), Functions, Theorems, Theory.
Identifiers: Uniqueness theorem.

A best possible result concerning the uniqueness of solutions of the heat equation is obtained. In particular, the following theorem is proved: Let u (x,t) be a solution of the heat equation in the strip 0 < t < c. Suppose that (i) u (x,t) = or < epsilon (t)eax2t to the -1 power where epsilon (t) = 0 (1) as t approaches 0 where alpha is a positive constant and (ii) lim as t approaches 0 u (x,t) = 0 for every x. Then u (x,t) is identically zero in the strip 0 < t < c. Other results concerning the heat equation are also obtained. (Author)
AD-653 255 Not available from CFSTI.

ALGEBRAIC, RATIONAL AND CONTEXT-FREE POWER-SERIES IN NON-COMMUTING VARIABLES.
Hebrew Univ Jerusalem (Israel)
For primary bibliographic entry see Field 5G.
AD-653 262 HC$3.00 MF$0.65

LEAST SQUARES ANALYSIS WITH A DYNAMIC MODEL.
Technical rept.,
Wisconsin Univ Madison Dept of Statistics
G. E. P. Box, G. M. Jenkins, and D. W. Wichern.
Mar 67, 24p Rept no. TR-105
Grant AF-AFOSR-1158-66
Prepared in cooperation with Lancaster Univ.

Descriptors: (*Least squares method, Mathematical models), Chemical reactions, Correlation techniques, Iterations, Mathematics, Theory.

Frequently in the study of dynamic systems one is faced with estimating the parameters in a mathematical model. A typical example of the situation we have in mind might arise in the study of the dynamics of a chemical process. In such a case, the x's would be manipulated inputs such as temperatures and concentrations while the y would represent the observed system output. For example, y might be the concentration of a particular chemical product. Even in simple cases one may be involved in estimation difficulties due to the number of parameters and the nonlinearity of the situation. To determine whether existing non-linear estimation procedures could be used to obtain precise estimates of the parameters in a mathematical model, it was decided to run an experiment with manufactured data.
AD-653 265 HC$3.00 MF$0.65

ROBUST ESTIMATES OF LINEAR TREND IN MULTIVARIATE TIME SERIES.
Technical rept.,
Wisconsin Univ Madison Dept of Statistics
G. K. Bhattacharyya. Mar 67, 21p Rept no. TR-107
Contract Nonr-1202 (17)

Descriptors: (*Multivariate analysis, Mathematical models), (*Real time, Statistical analysis), Random variables, Efficiency, Distribution functions, Asymptotic series, Theorems, Permutations, Inequalities.

Median and weighted median estimates are obtained for the linear trend parameters of a univariate time series by applying the Hodges-Lehmann method to some well known nonparametric tests for trend. The estimation procedure is extended to the multivariate trend model and asymptotic efficiency properties relative to the classical estimates are studied.
AD-653 267 HC$3.00 MF$0.65

ASYMPTOTIC NORMALITY OF CERTAIN FUNCTIONS DEFINED ON A MARKOV PROCESS.
Technical rept.,
Wisconsin Univ Madison Dept of Statistics
George G. Roussas. Apr 67, 21p Rept no. TR-109
Contract Nonr-1202 (17), Grant NSF-GP-6242

Descriptors: (*Statistical processes, Theorems), Functions, Probability, Inequalities, Mathematics, Theory.

In the present paper it is first proved that, under essentially the same conditions, the quotients (summation from m=1 to m-n of g sub m/summation from m=1 to m=n of f sub m) and (summation from m=1 to m=n of f sub m/summation from m=1 to m=n of g sub m) properly normalized, are also asymptotically normal. Next, the functions f and g are also considered to be dependent on n--the number of the random variables X sub j, j=1,...,n--and asymptotic normalities similar to the ones mentioned above are established under a number of conditions. The results obtained here are useful in statistical applications and are applied in the problem of non-parametric estimation in Markov processes.
AD-653 271 HC$3.00 MF$0.65

NONPARAMETRIC ESTIMATION IN MARKOV PROCESSES.
Technical rept.,
Wisconsin Univ Madison Dept of Statistics
George C. Roussas. Apr 67, 13p Rept no. TR-110
Contract Nonr-1212 (17), Grant NSF-GP-6242

Descriptors: (*Statistical processes, Theorems), Probability, Mathematics, Theory.
Identifiers: Euclidean space.

The purpose of the present paper is to consider the non-parametric estimation of densities in the case of Markov processes. Asymptotically unbiased estimates for the initial and (two-dimensional) joint densities are constructed. These estimates are shown to be consistent in quadratic mean, and furthermore a consistent, in the probability sense, estimate for the transition density is obtained. It is shown that, under suitable conditions, all three estimators mentioned, properly normalized, are asymptotically normal.
AD-653 272 HC$3.00 MF$0.65

UNIFORM ASYMPTOTIC SOLUTIONS OF DISCONTINUOUS INITIAL VALUE PROBLEMS FOR DISPERSIVE HYPERBOLIC EQUATIONS.
Revised ed.,
New York Univ N Y Courant Inst of Mathematical Sciences
J. Boersma. 6 Jun 66, 17p
AFOSR-67-1249
Grant AF-AFOSR-537-64
Revision of manuscript submitted 15 Nov 65.
Availability: Published in Quarterly of Applied Mathematics v25 n1 p31-44 Apr 1967.

Descriptors: (*Asymptotic series, Problem solving), Partial differential equations, Value engineering, Anomalies, Differential equations, Boundary value problems, Integral transforms, Integrals, Numerical analysis.

The paper is concerned with a discontinuous initial value problem for a dispersive hyperbolic equation where the dispersive term of the equation contains a large parameter. In the case of an equation with constant coefficients the initial value problem can be solved exactly leading to an integral representation which is expanded asymptotically. Non-uniform and uniform asymptotic expansions are obtained. The non-uniform expansion is singular on a certain space-time line. This singularity is similar to the anomaly occurring at a shadow-boundary in geometrical optics. For the equation with non-constant coefficients non-uniform and uniform asymptotic solutions of the initial value problem are derived by ray methods. It is verified that these solutions are in perfect agreement with the non-uniform and uniform asymptotic expansions of the exact solution of the problem.
AD-653 283 Not available from CFSTI.

LA CONVEXITE HOLOMORPHE DANS L'ESPACE ANALYTIQUE DES CYCLES D'UNE VARIETE ALGEBRIQUE (Holomorph Convexity in the Space of Cycles of an Algebraic Variety),
Pisa Univ (Italy) Istituto Matematico
Aldo Andreotti, and Francois Norguet. 3 May 66, 56p
AFOSR-67-1273
Grant AF-EOAR-42-65
Text in French; summary in English.
Availability: Published in Annali della Scuola Normale Superiore di Pisa Classe di Scienze v21 n1 p31-82 1967.

Descriptors: (*Algebra, Mathematics), Transformations (Mathematics), Theory.
Identifiers: Algebraic variety.

Let X be a q-convex open subset of a projective algebraic variety and denote by C sub q, super t (X) the locally algebraic variety of positive q-cycles with compact support in X. We endow C sub q, super t (X) with the structure of its weak normalisation. A natural map q super o: H super q (X, Omega superscript q) approximately H super o (C sub q, super t (X), theta) is defined and it is prooved that C sub q, super t (X) is holomorphically convex. If moreover X is q-complete then C sub q, super t (X) is a holomorphically complete space.
AD-653 297 Not available from CFSTI.

THE DEFINABILITY OF CARDINAL NUMBERS.
Technical rept.,
Hebrew Univ Jerusalem (Israel)
Azriel Levy. Mar 67, 44p Rept no. TR-26
Contract F61052-67-C-0055

Descriptors: (*Set theory, Theorems), (*Model theory, *Mapping (Transformations)), Symbols, Israel, Metamathematics, Calculus of variations, Language, Theorems, Mathematical models.

Cardinal numbers are known to be definable in set theory with the axiom of choice or with the axiom of foundation. In the absence of these two axioms the notion of a cardinal number is shown to be undefinable in ZF, in several strong senses. The proofs use models of the Fraenkel-Mostowski type.
AD-653 298 HC$3.00 MF$0.65

SOME LIMIT THEOREMS FOR A GENERAL MARKOV PROCESS,
Minnesota Univ Minneapolis Dept of Mathematics
N. C. Jain. 27 Jan 66, 21p
AFOSR-67-1271
Grant AF-AFOSR-381-66
Availability: Published in Z. Wahrscheinlichkeitstheorie verw. Geb. 206-23 1966.

Descriptors: (*Statistical processes, Theorems), Probability, Measure theory, Mathematics.

A Markov process X sub o, X sub 1, X sub 2,..., with stationary transition probability function P (X,E) and state space (X,Beta) is considered, where X is an abstract set and Beta is assumed countably generated. The recurrence condition first introduced by T. E. Harris (Proc. Third Berkeley Symp., II, 113-124, 1956), is assumed. The present paper gives several limit theorems for a general Markov process.
AD-653 308 Not available from CFSTI.

SOME RESULTS ON FINITE SEMIGROUPS,
California Univ Berkeley
For primary bibliographic entry see Field 20K.
AD-653 310 Not available from CFSTI.

ON MINIMAL MODULO 2 SUMS OF PRODUCTS FOR SWITCHING FUNCTIONS.
Technical rept.,
Technion - Israel Inst of Tech Haifa
Shimon Even, Igal Kohavi, and Azaria Paz. 15 Mar 66, 20p Rept no. TR-23
Contract N62558-3882

Descriptors: (*Special functions (Mathematical), *Switching circuits), Algorithms, Theorems, Flow charting, Inequalities, Mathematics.
Identifiers: Switching functions, Symmetric functions.

The minimal number of terms required for representing any switching function as a modulo-2 sums of products is investigated, and algorithm for obtaining economical ralizations is described. The main result is the following: Every symmetric function of 2m+1 variables has a modulo-2 sum of products realization with at most 3 to the mth power terms, but there are functions of n variables which require at least 2 to the nth power/n log to the base 2 of 3 terms, for sufficiently large n. (Author)
AD-653 311 HC$3.00 MF$0.65

A GENERALIZATION OF WEDDERBURN'S THEOREM,
California Univ Santa Barbara
D. L. Outcalt, and Adil Yaqub. 22 Apr 66, 6p
AFOSR-67-1242
Grants AF-AFOSR-698-65, NSF-GP-4163
Availability: Published in Proceedings of the American Mathematical Society v18 n1 p175-7 Feb 1967.

Descriptors: (*Rings (Mathematics), Theorems).

Wedderburn's Theorem, asserting that a finite division ring is necessarily commutative, is generalized in the following manner: Let R be an associative ring with Jacobson radical J such that R/J is a finite ring with exactly q elements. Suppose (1) R/J is a division ring, (2) j2=O, and (3) the number of distinct qth powers of all elements of R is at most q. Then R is commutative.
AD-653 315 Not available from CFSTI.

POWER-ASSOCIATIVE ALGEBRAS IN WHICH EVERY SUBALGEBRA IS AN IDEAL,
California Univ Santa Barbara
D. L. Outcalt. 1967, 8p
AFOSR-67-1240
Grant AF-AFOSR-698-65
Availability: Published in Pacific Journal of Mathematics v20 n3 p481-5 1967.

Descriptors: (*Algebras, Theorems), (*Rings (Mathematics), Identities).

By an H-algebra was meant a nonassociative algebra (not necessarily finite-dimensional) over a field in which every subalgebra is an ideal of the algebra. The paper proves: MAIN THEOREM. Let A be a power-associative algebra over a field F of characteristic not 2. A is an H-algebra if and only if A is one of the following; (1) a one-dimensional idempotent algebra; (2) a zero algebra; (3) an algebra with basis uo, ui, i epsilon I (an index set of arbitrary cardinality) satisfying uiuj = alpha ijuo, alpha ij epsilon F, i, j epsilon I, all other products zero.
AD-653 316 Not available from CFSTI.

ATTAINABLE SETS AND GENERALIZED GEODESIC SPHERES,
Brown Univ Providence R I Center for Dynamical Systems
For primary bibliographic entry see Field 8E.
AD-653 317 Not available from CFSTI.

THE LAPLACE TRANSFORM AND INITIAL-BOUNDARY VALUE PROBLEMS,
Carnegie Inst of Tech Pittsburgh Pa
R. C. MacCamy. 1966, 16p
AFOSR-67-1265
Grant AF-AFOSR-647-66
Availability: Published in Journal of Mathematical Analysis and Applications v16 n1 15p Oct 1966.

Descriptors: (*Boundary value problems, *Integral transforms), (*Transformations (Mathematics), *Partial differential equations), Integral equations, Special functions (Mathematical), Asymptotic series, Wave functions, Problem solving, Theorems.

The behavior of solutions of initial, boundary-value problems at large times is studied. The asymptotic behavior for large times is related to the solution of elliptic problems by means of the Laplace transform. Two types of problems are studied, interior parabolic problems and exterior problems for the wave equation.
AD-653 318 Not available from CFSTI.

BIPOLAR EXPANSION OF SCREENED COULOMB POTENTIALS, HELMHOLTZ' SOLID HARMONICS, AND THEIR ADDITION THEOREMS,
Uppsala Univ (Sweden)
For primary bibliographic entry see Field 20J.
AD-653 320 Not available from CFSTI.

STABILITY INDICATIVE FUNCTION AND ITS APPLICATION TO SYSTEMS WITH TIME DELAY,
Stanford Univ Calif
Yasutada Kashiwagi, and I. Fluegge-Lotz. 22 Apr 66, 11p
AFOSR-67-1260
Contract AF 49 (638)-1431
Prepared in cooperation with Virginia Polytechnic Inst., Blacksburg.
Availability: Published in Ingenieur-Archiv v35 n2 p332-9 1967.

Descriptors: (*Linear systems, *Differential equations), Stability, Equations, Theory, Velocity, Feedback, Topology.

The study investigates the stability of linear systems with time delay, and it is not sufficient to know critical values of such a parameter as time delay. In order to determine whether or not the system is stable for a given delay, the 'stability indicative function' is introduced. This function is applied to second-and third-order linear systems with time delay and the stability regions of several cases are obtained. Some examples clearly show that the existence of time delay may make a stable system unstable or an unstable system stable. This phenomenon is explained from a theoretical point of view. (Author)
AD-653 327 Not available from CFSTI.

CALCULATION OF IONIZATION POTENTIAL OF VARIOUS ATOMS,
Army Electronics Command Fort Monmouth N J Inst for Exploratory Research
For primary bibliographic entry see Field 20H.
AD-653 339 Not available from CFSTI.

ORTHOGONAL WAVES ON ELECTRON BEAMS.
Army Electronics Labs Fort Monmouth N J
For primary bibliographic entry see Field 9A.
AD-653 341 Not available from CFSTI.

ON THE CLASSIFICATION OF SINGULAR AND NONSINGULAR EXTREMALS FOR THE PONTRYAGIN MAXIMUM PRINCIPLE,
Grumman Aircraft Engineering Corp Bethpage N Y
Joseph C. Dunn. 1966, 38p
AFOSR-67-1257
Contract AF 49 (638)-1512
Availability: Published in Journal of Mathematical Analysis and Applications v17 n1 p1-36 Jan 1967.

Descriptors: (*Control, Optimization), (*Differential equations, *Calculus of variations), Hamiltonian, Equations of state, Theorems, Approximation (Mathematics), Mathematics.
Identifiers: Pontryagin's maximum principle.

The impetus for the present work came partially from one of Kalman's lectures on the theory of optimal control and the calculus of variations, dating back to 1960. Kalman described circumstances under which one could identify the characteristic curves of the Bellman-Hamilton-Jacobi equation with extremal trajectories satisfying the requirements of the Pontryagin maximum principle. It was necessary to relate certain partial derivatives of the pseudo-Hamiltonian function to the corresponding partial derivatives of the maximized (or minimized) pseudo-Hamiltonian, since the Pontryagin maximum principle is phrased in terms of the former, whereas the canonical characteristic differential equations are stated in terms of the latter. But Kalman was able to establish the desired relationship only under several rather restrictive smoothness assumptions on the equations of state, on the boundary of the set of admissible control inputs, etc. However, one can deduce an even stronger result under the hypotheses usually invoked in the proof of the maximum principle, hypotheses which are considerably weaker than those used by Kalman. Of still greater interest is the fact that this strengthened result also has a valid converse for processes having compact admissible control input sets, a requirement which is often satisfied in practice.
AD-653 356 Not available from CFSTI.

EVALUATION OF SOME TRANSPORT INTEGRALS. II.
Battelle Memorial Inst Columbus Ohio Columbus Labs
For primary bibliographic entry see Field 20J.
AD-653 375 Not available from CFSTI.

THE EQUILIBRIUM OF SLOWLY ROTATING CONFIGURATIONS IN THE POST-NEWTONIAN APPROXIMATION: CORRECTIONS TO CLAIRAUT'S EQUATION; THE APPEARANCE OF A ROTATING CONFIGURATION AS VIEWED FROM INFINITY.
Chicago Univ Ill
For primary bibliographic entry see Field 20D.
AD-653 376 Not available from CFSTI.

LINEAR OPTIMUM PREDICTORS.
Johns Hopkins Univ Baltimore Md
For primary bibliographic entry see Field 9D.
AD-653 377 Not available from CFSTI.

ON THE RELATION BETWEEN A PARTICULAR STOCHASTIC PROCESS AND ITS TWO IMBEDDED MARKOV PROCESSES,
Johns Hopkins Univ Baltimore Md
J. L. Gastwirth, and S. S. Wolff. Apr 66, 7p
Contracts Nonr-4010 (13), Nonr-4010 (09)
Availability: Published in Sankhya, The Indian Journal of Statistics, SerA v28 pts2/3 p151-6 1966.

Descriptors: (*Stochastic processes, *Statistical processes), (*Random variables, *Inequalities), Algebra, Distribution functions, Sequences, Inequalities, Functions, Probability, India.

Consider the stochastic process S (t) = summation, 0<tau sub n = or <t, of epsilon sub n, e to the power - alpha (t - tau sub n), where the times (tau sub n) form a renewal process and the epsilon sub n are i.i.d. random variables. We analyze the two imbedded Markov processes S sub n superscript (-) = S (tau sub n, superscript-) and S sub n, superscript (+) = S (tau sub n, Superscript +). One might expect that the moments of the limiting processes S* = limit as t approaches infinity, of S (t); S+ = limit as t approaches infinity of S sub n, superscript +; and, S- = limit as n goes to infinity of S sub n superscript (-) would satisfy the inequality E ((S-) to the rth power) = or < E ((S*) to the rth power) = or < E ((S+) to the rth power). This is true if the inter-arrival c.d.f. has an increasing hazard rate, but is not true in general.
AD-653 380 Not available from CFSTI.

STABILITY OF STOCHASTIC DYNAMICAL SYSTEMS,
Brown Univ Providence R I Div of Applied Mathematics
Harold J. Kushner. 1966. 32p
AFOSR-67-1278
Grants AF-AFOSR-693-64, NGR-40-002-015
Availability: Published in Advances in Control Systems v4 p73-102 1966.

Descriptors: (*Stochastic processes, Stability), (*Differential equations, Stability), Theorems, Convergence, Random variables, Statistical processes, Linear systems, Mathematics.
Identifiers: Lyapunov functions.

This paper contains two parts. One part discusses some work of other authors on the stability of systems described by linear differential equations whose coefficients are random processes. The more important part develops the stochastic Liapunov function approach to the study of stability properties of non-linear stochastic differential equations of the Ito form dx = f (x,t)dt + sigma (x,t)dz, where z sub t is either a Wiener or Poisson process. A stochastic Liapunov function is a suitable function of x, which also has the super martingale property in a suitable neighborhood. Liapunov criteria to assure that P sub x (sup, infinity > t = or > 0, the absolute value of x sub t > epsilon) < n will hold for x in some neighborhood of the origin are proved, as are other related results. (Author)
AD-653 383 Not available from CFSTI.

MATHEMATICAL CONSIDERATIONS OF THE MODIFIED NORMAL DISTRIBUTION,
National Research Council of Canada Ottawa (Ontario)
P. J. McLane. Mar 67. 13p Rept no. NRC-9497
Availability: Published in The Journal of the International Association of Geodesy n83 p1-12 Mar 1 1967.

Descriptors: (*Probability density functions, *Mathematical analysis), (*Geodesics, Mathematical analysis), Integral transforms, Fourier analysis, Polynomials, Functions.

In the paper, Romanowski's modified normal distribution is considered from the mathematical standpoint. Initially, the characteristic function is computed. This function is then utilized to compute moments, demonstrate normal tendency as the modulating ('a') parameter tends to infinity, to formulate the modified normal distribution in terms of well known classical functions. To complete this mathematical consideration, the probability distribution is formulated in terms of tabulated functions. The paper is concluded with a discussion on the direction for further research. (Author)
AD-653 390 Not available from CFSTI.

SURFACE-ENERGY TENSORS FOR ELLIPSOIDS.
Doctoral thesis,
Chicago Univ Ill Dept of Physics
Carl E. Rosenkilde. 30 May 66. 10p
Contrac t Nonr-2121 (24)
Prepared in cooperation with California Research Corp., Richmond.
Availability: Published in Journal of Mathematical Physics v8 n1 p88-97 Jan 1967.

Descriptors: (*Ellipsoids, *Surface properties), Integral equations, Surface tension, Tensor analysis, Stability, Equilibrium, Gravity, Symbols, Transformations (Mathematics).

The surface-energy tensors are evaluated for ellipsoidal surfaces in terms of particular types of elliptic integrals which have simple algebraic recursion relations that are useful for numerical evaluation. The final expressions are given in a form appropriate for an investigation of stability using the method of the tensor virial. (Author)
AD-653 393 Not available from CFSTI.

TIME DEPENDENT NONLINEAR SOLUTION OF THE LANDAU-VLASOV EQUATIONS FOR AN ELECTRON-ION DIODE.
Part I of Final rept.,
Michigan Univ., Ann Arbor. Electron Physics Lab.
R. J. Lomax. Aug 66. 58p TR-92. 05834-12-T
Contract DA-36-039-AMC-02269 (E)

Descriptors: (*Electric arcs, *Equations), Monte Carlo method, Thermionic converters, Plasma physics, Functions, Equilibrium, Polynomials.

A set of moment equations is obtained from the Landau-Vlasov equation. In order to simplify application of the boundary conditions in a diode-like device, separate moments are defined for negative and positive velocities. The set of equations is truncated at a finite order and closed by assuming that expansion of the velocity distribution function can be made in terms of a finite number of orthogonal functions. Methods are discussed of integrating the equations numerically after transforming them to canonical form. Some examples are given and possible extensions to more general situations are mentioned. (Author)
AD-802 564 HC$3.00 MF$0.65

TWO ALGORITHMS FOR COMPUTING THE GENERALIZED INVERSE OF A MATRIX,
Oak Ridge Gaseous Diffusion Plant, Tenn.
For primary bibliographic entry see Field 9B.
For abstract, see NSA 21 02.
K-1641 HC$3.00 MF$0.65

UNITS OF WEIGHT AND MEASURE. INTERNATIONAL (METRIC) AND U. S. CUSTOMARY,
National Bureau of Standards, Washington, D. C. Inst. for Applied Technology.
For primary bibliographic entry see Field 14B.
NBS Misc Pub-286 HC$1.50 MF$0.65

LYAPUNOV FUNCTIONS FROM AUXILIARY EXACT DIFFERENTIAL EQUATIONS.
Rochester Univ., N. Y.
C.-S. Chen, and E. Kinnen. May 67. 31p NASA-CR-799
Grant NSG-574

Descriptors: *Differential equation, *Nonlinear equation, *Problem solving, Auxiliary, Derivation, Differential, Equation, Exactness, Function, Integration, Nonlinear, Phase, Problem, Solution, Space.

For abstract, see STAR 05 14.
N67-26556 HC$3.00 MF$0.65

A METHOD FOR EXPANDING A DIRECTION COSINE MATRIX INTO AN EULER SEQUENCE OF ROTATIONS.
National Aeronautics and Space Administration. Electronics Research Center, Cambridge, Mass.
H. O. Lee, G. Meyer, and W. R. Wehrend, Jr., Jun 67. 16p NASA-TM-X-1384

Descriptors: *Directional control, *Euler equation, *Matrix algebra, *Rotation, Algebra, Angle, Calculation, Computation, Control, Conversion, Cosine, Direction, Equation, Equivalence, Fortran, Matrix, Sequence, Series, Set, Theory.

For abstract, see STAR 05 14.
N67-27264 HC$3.00 MF$0.65

LECTURE NOTES ON NONEXPANSIVE AND MONOTONE MAPPINGS IN BANACH SPACES.
Brown Univ., Providence, R. I. Center for Dynamical Systems.
Z. Opial. Jan 67. 133p NASA-CR-84418
Contracts NGR-40-002-015, DA-31-124-ARO/D/-270
Its Lecture Notes 67-1

Descriptors: *Banach space, *Mapping, Analysis, Approximation, Convexity, Functional, Linear, Monotone, Set, Space, Theory, Topology.

For abstract, see STAR 05 14.
N67-27377 HC$3.00 MF$0.65

SOLUTIONS OF SYSTEMS OF NONLINEAR EQUATIONS FINAL REPORT.
Lockheed Missiles and Space Co., Huntsville, Ala.
28 Oct 66. 147p NASA-CR-84448, LMSC/HREC-A783333
Contract NAS8-20178

Descriptors: *Computer program, *Nonlinear equation, *Transcendental function, Algebra, Computer, Digital, Equation, Function, Method, Nonlinear, Program, Simultaneous, Solution, System, Transcendental.

For abstract, see STAR 05 14.
N67-27423 HC$3.00 MF$0.65

CHEBYSHEV APPROXIMATIONS FOR THE STUMPFF SERIES OF ORDERS FOUR AND FIVE INTERIM REPORT.
Analytical Mechanics Associates, Westbury, N.Y.
H. E. Salzer. Jan 67. 14p NASA-CR-84488, REPT.-67-2
Contract NAS5-9085

Descriptors: *Chebyshev approximation, *Recursion formula, Coefficient, Expansion, Formula, Function, Polynomial, Reduction, Series, Truncation.

For abstract, see STAR 05 14.
N67-27644 HC$3.00 MF$0.65

STATISTICAL METHODS AND SUBJECTIVE PROBABILITY STATUS REPORT.
Oklahoma State Univ., Stillwater.
L. Folks. 1967. 34p NASA-CR-84487
Contract NGR 37-002-031

Descriptors: *Bayesian statistics, *Bibliography, *Probability, *Regression analysis, Analysis, Decision, Distribution, Prior, Regression, Statistics, Theory.

For abstract, see STAR 05 14.
N67-27645 HC$3.00 MF$0.65

ON THE ESTIMATION OF THE MATRIX OF A FINITE MARKOV PROCESS SEMIANNUAL STATUS REPORT, 1 DEC. 1966 - 31 MAY 1967.
Houston Univ., Tex.

D. R. Taylor. May 67, 8p NASA-CR-84514
Contract NGR-44-005-037

Descriptors: *Markov process, *Metrology, *Ring structure, *Topology, Abel function, Estimation, Homomorphism, Markov, Matrix, Near, Process, Ring, Stochastic, Structure, Transition.

For abstract, see STAR 05 14.
N67-27672 HC$3.00 MF$0.65

APPROXIMATE CONTINUOUS NONLINEAR MINIMAL-VARIANCE FILTERING.
California Univ., Los Angeles. Dept. of Engineering.
L. Schwartz. Apr 67, 84p NASA-CR-84517, REPT.-67-17B
Grant NSG-237-62

Descriptors: *Differential equation, *Mathematical model, *Nonlinear filter, *Variance, Approximation, Continuous, Derivation, Determination, Differential, Equation, Filter, Mathematics, Minimum, Model, Noise, Nonlinear, Orbit, Stochastic, Validity, White.

For abstract, see STAR 05 14.
N67-27675 HC$3.00 MF$0.65

APPLICATION OF THE A-P ALGORITHM TO NON-PROPORTIONALLY DAMPED VIBRATION PROBLEMS.
Technische Hochschule Stuttgart (West Germany).
P. C. Patton. 1966, 14p
Presented At the Symp. on Numerical Methods for Vibration Probl., Univ. of Southampton, 15 Jul. 1966

Descriptors: *Algorithm, *Differential equation, *Matrix analysis, *Structural vibration, *Vibration damping, Adjoint, Aerodynamic, Aircraft, Analysis, Application, Damping, Differential, Eigenvalue, Eigenvector, Equation, Matrix, Problem, Stability, Structural, Vibration.

For abstract, see STAR 05 14.
N67-27711 HC$3.00 MF$0.65

EIGENREDUCTION OF COMPLEX MATRICES BY THE A-P ALGORITHM - A FORTRAN IV PROGRAM.
Technische Hochschule Stuttgart (West Germany).
For primary bibliographic entry see Field 9B.
For abstract, see STAR 05 14.
N67-27776 HC$3.00 MF$0.65

FORTRAN PROGRAM FOR CALCULATING THE SOLID ANGLE SUBTENDED BY ONE CIRCULAR DISC AT ANOTHER,
Oak Ridge National Lab., Tenn.
I. R. Williams, A. M. Craig, Jr., and C. L. Thompson. Apr 67, 13p
Contract W-7405-eng-26

Descriptors: (*Programming languages, Geometric forms), (*Disks, *Monte Carlo method), Integration, Numerical analysis, Nuclear physics, Detectors, Collimators, Geometry, Radiation measurement systems.

For abstract, see NSA 21 12.
ORNL-4099 HC$3.00 MF$0.65

MARTINGALE VERSION OF A DOMINATED ERGODIC TYPE THEOREM,
Purdue Univ., Lafayette, Ind. Dept. of Statistics.
Henry Teicher. Mar 67, 5p Mimeograph Ser-103
Grant NSF-GP-4590

Descriptors: (*Measure theory, *Statistical analysis), (*Sequences, *Statistical distributions), Theorems, Random variables, Numerical methods and procedures, Integrals, Series.

A strengthened form of Wiener's dominated ergodic theorem for the special case of independent, identically distributed (i.i.d) random variables with mean zero is given. In this note, a martingale version is recorded.
PB-174 796 HC$3.00 MF$0.65

12B. OPERATIONS RESEARCH

OPTIMUM PROCESSES IN SYSTEMS WITH DISTRIBUTED PARAMETERS AND SOME PROBLEMS OF INVARIANCE THEORY,
Redstone Scientific Information Center Redstone Arsenal Ala Translation Branch
A. I. Egorov. 2 Mar 67, 93p
RSIC-649, TT-67-62056
Trans. of Akademiya Nauk SSSR. Izvestiya. Seriya Matematicheskaya, v29 n6 p1205-60 1965.

Descriptors: (*Control systems, Optimization), (*Invariance, Problem solving), Differential equations, Calculus of variations, Difference equations, Boundary value problems, Real numbers, Partial differential equations, Inequalities, Theorems, Banach space, Functional analysis.

The article presents a study of optimum processes in systems whose behavior is described by distinguishable boundary problems for equations with partial derivatives. The method is the same as that used by Rozonoer in 1959 to investigate the case where the control process is described by ordinary differential and finite-difference equations.
AD-652 728 HC$3.00 MF$0.65

GENERATING FUNCTIONS WITH INTEGRATORS,
Harry Diamond Labs Washington D C
For primary bibliographic entry see Field 9E.
AD-652 729 HC$3.00 MF$0.65

E-POINTS OF GAMES,
Princeton Univ. N J Econometric Research Program
For primary bibliographic entry see Field 12A.
AD-652 786 Not available from CFSTI.

NON-DISCOUNTED DENUMERABLE MARKOVIAN DECISION MODELS.
Technical rept.,
Stanford Univ Calif Dept of Statistics
Sheldon M. Ross. 2 May 67, 39p Rept no. TR-94
Contract Nonr-225 (53)

Descriptors: (*Costs, *Mathematical models), (*Decision theory, *Probability), Statistical processes, Operations research, Dynamic programming, Optimization, Replacement theory, Effectiveness, Sequences, Theorems.

Countable state, finite action Markovian decision processes are studied under the average cost criterion. The problem is studied by using the known results for the discounted-cost problem. Sufficient conditions are given for the existence of an optimal rule which is of the stationary deterministic type. This rule is shown to be, in some sense, a limit point of the optimal discounted-cost rules. Sufficient conditions are also given for the optimal discounted-cost rules to be epsilon-optimal with respect to the average cost criterion. It is shown that if there is a replacement action then there exists an optimal rule but it may not be of the stationary deterministic type. It is also shown how, in a special case, the average cost criterion can be reduced to the discounted cost criterion. Lastly, an example is given of a process for which there exists an optimal nonstationary rule which is better than any stationary rule.
AD-652 797 HC$3.00 MF$0.65

THE MATHEMATICAL THEORY OF A STATIONARY QUEUE,
Rand Corp Santa Monica Calif
For primary bibliographic entry see Field 12A.
AD-652 833 HC$3.00 MF$0.65

STRICTLY CONCAVE PARAMETRIC PROGRAMMING. PART I. BASIC THEORY. PART II. ADDITIONAL THEORY AND COMPUTATIONAL CONSIDERATIONS.
Doctoral thesis,
California Univ Los Angeles Western Management Science Inst
Arthur M. Geoffrion. Jun 66, 26p Rept no. WMSI Reprint-39
Contract Nonr-233 (75), Grant NSF-G-25064
Revision of manuscript submitted Jun 65.
Availability: Published in Management Science v13 n3/5 p244-53/359-70 Nov 1966-Jan 1967.

Descriptors: (*Mathematical programming, Theory), Functions, Algorithms, Optimization, Theses.
Identifiers: Concave programming.

This paper, which is presented in two parts, develops a computational approach to strictly concave parametric programs of the form: Maximize alpha f 1 (x) + (1 - alpha) f2 (x) subject to concave inequality constraints for each fixed value of alpha in the unit interval, where f1 and f2 are strictly concave and certain additional regularity conditions are satisfied. This class of problems subsumer a corresponding class of vector maximum problems and also, by means of a simple device, provides a deformation method for ordinary concave programming. The approach is based on exploiting the continuity properties of the parametric program so as to efficiently maintain a solution to the associated Kuhn-Tucker conditions as alpha traverses the unit interval. The same approach can be adapted to much more general parametric programs than the one above. In Part I, a Basic Parametric Procedure is derived and shown to be finite in a certain sense. It forms the basis of various parametric programming algorithms, depending on what special assumptions are made on the functions. In Part II, additional theory is developed that facilitates computational implementation, and one possible general-purpose algorithm for a digital computer is given. An illustrative graphical example is presented and several extensions are indicated. (Author)
AD-653 008 Not available from CFSTI.

THE COURNOT EQUILIBRIUM IN A NONSYMMETRIC OLIGOPOLISTIC MARKET,
Yale Univ New Haven Conn Cowles Foundation for Research in Economics
For primary bibliographic entry see Field 5C.
AD-653 086 HC$3.00 MF$0.65

THE NONSYMMETRIC GAME: JOINT MAXIMUM, EFFICIENT SOLUTION AND MEASURES OF COLLUSION AND WELFARE,
Yale Univ New Haven Conn Cowles Foundation for Research in Economics
For primary Bibliographic entry see Field 5C.
AD-653 087 HC$3.00 MF$0.65

THE SYMMETRIC ASSIGNMENT PROBLEM.
Research rept.,
California Univ Berkeley Operations Research Center
Katta G. Murty. Feb 67, 23p Rept no. ORC-67-12
Contract Nonr-222 (83), Grant NSF-GP-4593

Descriptors: (*Operations research, *Matrix algebra), Algorithms, Costs, Problem solving, Graphics, Equations, Transformations (Mathematics), Efficiency, Theorems.

A branch and bound algorithm for finding the minimal cost symmetric assignment is discussed. The

matching problem in graph theory and the Chinese Postman puzzle are all special cases of the symmetric assignment problem, and hence this algorithm can be applied to solve them.
AD-653 103 HC$3.00 MF$0.65

LIKELIHOOD RATIO TESTS FOR RESTRICTED FAMILIES,
California Univ Berkeley Operations Research Center
Richard E. Barlow. Apr 67, 36p Rept no. ORC-67-16
Contract Nonr-3656 (18)

Descriptors: (*Statistical analysis, Reliability), Mathematics, Stochastic processes, Distribution theory, Sampling, Functions.
Identifiers: Life test, Failure rate, Likelihood ratio tests.

Likelihood ratio tests for the problem: Ho: F epsilon G1 versus H1: F epsilon G- G1 are defined for certain nonparametric families of distributions G and G1. In particular the likelihood ratio test is defined and shown to be unbiased when G1 denotes the exponential distributions (possibly truncated) and G denotes the distributions with increasing failure rate. Comparisons are made with competing tests. The problem of testing for increasing failure rate average is also examined. (Author)
AD-653 104 HC$3.00 MF$0.65

STATISTICAL CONSIDERATIONS IN COMPUTER SIMULATION EXPERIMENTS,
Rand Corp Santa Monica Calif
George S. Fishman. May 67, 8p Rept no. P-3608
Submitted for publication in Proceedings of Conference, Computer Science and Statistics, a Symposium on the Interface, California Univ., Los Angeles Feb 1, 1967.

Descriptors: (*Digital computers, Models (Simulations)), (*Models (Simulations), *Queueing theory), Monte Carlo method, Stochastic processes, Analysis, Tests, Reliability, Statistical analysis.

This report discusses some statistical questions related to the analysis of digital computer simulation experiments. The remarks are confined to systems simulations that are or that contain queueing networks; for example, inventory models and job shop manufacturing facilities. The basic assumption is that these systems contain elements of random behavior so that the system output is a random variable. This paper describes some fundamental statistical problems that should be recognized in a simulation experiment from the initial phase of problem definition through the final stage of analysis of results.
AD-653 174 HC$3.00 MF$0.65

NETWORKS, FRAMES, BLOCKING SYSTEMS,
Rand Corp Santa Monica Calif
D. R. Fulkerson. May 67, 63p Rept no. RM-5368-PR
Contract F44620-67-C-0045

Descriptors: (*Programming (Computers), Algorithms), (*Game theory, *Linear programming), Theorems, Combinatorial analysis, Inequalities, Real numbers, Networks, Determinants.

A survey of some of the basic problems, theorems, and constructions for flow networks, and their extension to more general combinatorial structures. One generalization is that obtained by replacing the vertex-edge incidence matrix of an oriented network by an arbitrary real matrix. This leads to the notion of a frame of a sub-space of Euclidean n-space, a concept very closely allied to that of a real matric matroid. The treatment relates matroid theory and linear programming theory, and thus provides another viewpoint on linear programming, and in particular, on digraphoid-programming. In addition, a very general combinatorial structure called a blocking system is given an axiomatic formulation. These systems have arisen in a variety of contexts, including multi-person game theory and abstract covering problems. It is shown that one of the network theorems surveyed in the study extends to all blocking systems, and indeed characterizes such systems.
AD-653 178 HC$3.00 MF$0.65

A HILLCLIMBING TECHNIQUE USING PIECEWISE CUBIC APPROXIMATION,
Purdue Univ Lafayette Ind School of Electrical Engineering
For primary bibliographic entry see Field 9C.
AD-653 215 HC$3.00 MF$0.65

SOME BAYESIAN STRATIFIED TWO-PHASE SAMPLING RESULTS.
Technical rept.,
Wisconsin Univ Madison Dept of Statistics
Norman R. Draper, and Irwin Guttman. Mar 67, 23p Rept no. TR-86
Contracts Nonr-1202 (17), DA-31-124-ARO (D)-462

Descriptors: (*Sampling, Optimization), (*Costs, Population (Mathematics)), Decision making, Numerical analysis, Partial differential equations, Groups (Mathematics), Statistical distributions, Distribution functions, Numbers, Budgets.

Some results were obtained concerning the optimum allocation of sampling effort among k strata at the second phase of a two phase sampling procedure, using information obtained from the first phase. Two different approaches are employed; a Bayesian posterior analysis and a Bayesian preposterior analysis. Two different allocation methods are derived and illustrated with some numerical examples, for cases where some or all of the nuisance parameters are unknown. The problem when all nuisance parameters are known has been discussed by Ericson (1965).
AD-653 264 HC$3.00 MF$0.65

ISN'T MY PROCESS TOO VARIABLE FOR EVOP.
Technical rept.,
Wisconsin Univ Madison Dept of Statistics
G. E. P. Box, and N. R. Draper. Mar 67, 13p Rept no. TR-106
Contract Nonr-1202 (17), Grant AF-AFOSR-1158-66

Descriptors: (*Operations research, Errors), Probability, Performance (Engineering), Detection, Noise, Signals, Control systems, Information theory, Input-output devices, Accuracy, Interpolation, Signal-to-noise ratio, Approximation (Mathematics).

In this paper this question is answered in the negative. First it is pointed out that large variability implies the existence of large effects waiting to be found. Second it is shown that an EVOP scheme which produces only a modest increase in the basic process variation can lead to detection of effects in a very few cycles.
AD-653 266 HC$3.00 MF$0.65

EXPERIMENTAL STRATEGY.
Technical rept.,
Wisconsin Univ Madison Dept of Statistics
G. E. P. Box. Apr 67, 19p Rept no. TR-111
Contract Nonr-1202 (17)

Descriptors: (*Model theory, *Iterations), (*Biometry, Symposia), Learning, Mathematical models, Probability, Polynomials, Interpolation, Interactions, Scientific research, Experimental design, Errors, Operations research, Differential equations, Perturbation theory, Convergence, Population (Mathematics), Transformations (Mathematics), Experimental data.

In this paper the basic iterative nature of experimental learning process is emphasized. The role of iteration is then discussed for a number of specific classes of problems. These include the screening of variables, empirical model building, mechanistic model fitting. Recent contributions to the important problem of mechanistic model building are emphasized.
AD-653 273 HC$3.00 MF$0.65

VARIABLE TIME OPTIMAL CONTROL.
California Univ., Los Angeles. Dept. of Engineering.
For primary bibliographic entry see Field 9C.
For abstract, see STAR 05 14.
N67-27670 HC$3.00 MF$0.65

OPTIMAL CONTROL OF DISTRIBUTED PARAMETER SYSTEMS USING MULTILEVEL TECHNIQUES.
California Univ., Los Angeles. Dept. of Engineering.
For primary bibliographic entry see Field 9C.
For abstract, see STAR 05 14.
N67-27671 HC$3.00 MF$0.65

INTRODUCTION TO THE THEORY OF SPEED INDEPENDENT ASYNCHRONOUS SWITCHING CIRCUITS.
Princeton Univ., N. J., Digital Systems Lab.
For primary bibliographic entry see Field 9B.
PB-173 586 HC$3.00 MF$0.65

13. MECHANICAL, INDUSTRIAL, CIVIL, AND MARINE ENGINEERING

13A. AIR CONDITIONING, HEATING, LIGHTING, AND VENTILATING

AERODYNAMIC TESTING OF AN AIRBORNE LIGHTWEIGHT HIGH-EFFICIENCY RADIAL FAN.
Technical rept.,
Aerophysics Co Washington D C
William F. Foshag, Homer Ray, and Gabriel D. Boehler. Mar 67, 38p
USAAVLABS-TR-67-20
Contract DA-44-177-AMC-454 (T)

Descriptors: (*Aerodynamics, *Model tests), (*Airborne, *Fans), Electric motors, Pressure, Calibration, Efficiency, Noise, Centrifugal fields, Air, Design.

The results of the aerodynamic testing of a 66-inch diameter rotating-diffuser centrifugal fan for internal flow airborne applications are presented. To accommodate the testing of this unit, a testing facility had to be designed and built. Because of the availability of a test pad and high-power variable frequency electric motor equipment, the facility was located on the grounds of the Aerodynamics Laboratory of the U. S. Navy David Taylor Model Basin. The test stand and its calibration are described, and the results are presented. Results of the tests indicate a peak total pressure efficiency of 85 percent. This correlates with model fan information, including an experimentally determined scale effect. The RD fan is thus found to be an efficient, robust, stable air mover for air cushion vehicles and for other lightweight airborne applications. A limited noise survey investigation was made. It indicated low noise levels for the RD fan. (Author)
AD-652 725 HC$3.00 MF$0.65

LIGHT HOUSINGS FOR DEEP-SUBMERGENCE APPLICATIONS. PART I. FOUR-INCH-DIAMETER GLASS FLASKS WITH CONICAL PIPE FLANGES.
Technical rept., Aug 65-Sep 66,
Naval Civil Engineering Lab Port Hueneme Calif
J. D. Stachiw, and K. O. Gray. Jun 67, 49p Rept no. NCEL-TR-532

Descriptors: (*Underwater lights, Containers), Deep submergence, Glass, Pipes, Flanges, Design, Performance (Engineering).

The objective of the study was to evaluate commercially available glass reaction flasks and cover caps for application as transparent housings for underwater lights. Four-inch-diameter reaction flasks and cover caps having conical pipe flanges and flat seating surfaces were imploded under short-term, long-term, and cyclic pressure loading, and their critical pressures were recorded. Six designs for underwater lights utilizing such housings were prepared, built, operated in simulated hydrospace environment, and their performance was rated. The glass housings and the light assemblies withstood pressures equivalent to those at hypothetical ocean depths between 5,000 and 40,000 feet, the critical pressure depending on the size of the light housing, the design of the housing's end closure, and the mode of pressure loading. Under repeated submersion, the maximum operational depth of light assemblies with 4-inch-diameter reaction flasks and cover caps serving as light housings is 10,000 feet. (Author)
AD-653 293 HC$3.00 MF$0.65

FREQUENCY RESPONSE OF A FORCED-FLOW SINGLE- TUBE BOILER.
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
R. G. Dorsch. 1967, 21p NASA-TM-X-52306
To Be Presented At Symp. on Two Phase Flow Dyn., Eindhoven, the Netherlands, 4-9 Sep. 1967

Descriptors: *Frequency response, *Oscillating flow, *Tube heat exchanger, Boiler, Exchanger, Feeder, Flow, Freon, Frequency, Heat, Oscillation, Perturbation, Pressure, Pump, Response, Single, Stability, State, Steady, System, Tube, Water.

For abstract, see STAR 05 14.
N67-27237 HC$3.00 MF$0.65

13B. CIVIL ENGINEERING

EVALUATION OF THE AASHO PROFILOMETER FOR MEASURING AIRFIELD PAVEMENT PROFILES.
Special rept.,
Cold Regions Research and Engineering Lab., Hanover, N. H.
E. J. Yoder, and R. D. Walker. Apr 66, 28p
CRREL-SR-96
Prepared in cooperation with Purdue Univ., Lafayette, Ind.

Descriptors: (*Landing fields, *Pavements), Instrumentation, Runways, Accuracy, Roughness, Operation, Velocity, Towing vehicles, Concrete.

Contents: The AASHO profilometer; Evaluation tests; AASHO profilometer in operation; Schematic diagram of profilometer; Analog chart, slope wheels and horizontal reference operating; Analog chart, horizontal reference operating alone; Location of test tracks, Chanute AFB. (Author)
AD-486 830 HC$3.00 MF$0.65

ECONOMIC IMPACT OF INTERSTATE AND DEFENSE HIGHWAY 35 ON PERRY, OKLAHOMA.
Oklahoma State Dept. of Highways. Research and Development Div.
For primary bibliographic entry see Field 5C.
PB-173 729 HC$3.00 MF$0.65

USER DETERMINED ATTRIBUTES OF IDEAL TRANSPORTATION SYSTEMS: AN EMPIRICAL STUDY,
Maryland Univ., College Park. Dept. of Business Administration.
G. A. Brunner, S. J. Hille, A. N. Nash, F. T. Paine, and R. E. Schellenberger. Jun 66, 274p
Rept. no. 0624
Prepared in cooperation with Bureau of Public Roads, Washington, D. C.

Descriptors: (*Transportation, Public opinion), Questionnaires, Feasibility studies, Attitudes, Sampling, Factor analysis, Traffic, Roads, Urban areas, Maryland.

The objectives of the research are (a) to identify and assess the importance of attributes of an ideal transport system or systems, and (b) to determine the extent to which existing systems approach this ideal. This study was designed to appraise the reasibility of using a measuring approach involving the use of a quasi self-administered questionnaire and to interpret the responses. The answers to five specific questions were sought. They were derived from a ten question general design for the total research effort. The specific questions reflect the interest in the measurement approach as well as the attributes of an ideal urban transportation system.
PB-173 730 HC$3.00 MF$0.65

GROUND COVERS FOR HIGHWAY SLOPES. AN ANNOTATED BIBLIOGRAPHY,
Minnesota Univ., St. Paul. Dept. of Horticultural Science.
Albert G. Johnson, Margaret H. Smithberg, and Donald B. White. Jun 65, 133p Investigation-615
Prepared in cooperation with Bureau of Public Roads, Washington, D. C.

Descriptors: (*Roads, Soil mechanics), (*Soil mechanics, Erosion), Bibliographies, Plants (Botany), Trees, Seeds, Grasses, Costs, Maintenance, Civil engineering.

This bibliography is an outgrowth of an investigation into the use of woody ground cover plants for the revegetation of steep highway slopes in Minnesota. The planting of vegetative material is recognized as the most efficient, economical and aesthetically acceptable method of protecting slopes from erosion. The general use of turf-producing species alone on such slopes, however, presents certain problems in establishment and more particularly of maintenance. The difficulty of maintaining steep slopes, where access is often physically dangerous, is the compelling reason to seek plant materials that may reduce overall costs and at the same time provide effective cover and an attractive appearance. With the initiation of this investigation in 1962 a review of the literature was undertaken to determine the extent of current work. This review indicated there was enough interest in ground covers for highway planting to warrant publication of a bibliography of practices in this highly specialized use of plant materials.
PB-173 809 HC$3.00 MF$0.65

COMPUTER TECHNIQUES APPLIED TO THE ANALYSIS AND DESIGN OF TWO COLUMN BENT RIGID FRAME HIGHWAY BRIDGE PIERS AND OTHER BRIDGE DESIGN PROBLEMS,
South Carolina Univ., Columbia. Dept. of Civil Engineering.
Richard B. Pool. 1 Aug 66, 88p
Prepared in cooperation with Bureau of Public Roads, Washington, D. C.

Descriptors: (*Bridges, Computer programs), (*Roads, Bridges), Piers, Design, Analysis, Bending.

The report describes 22 computer programs developed for the analysis and design of two column rigid frame piers for highway bridges. The programs were developed in the FORTRAN programing language for an IBM 1620 digital computer with a basic storage capacity of 20,000 units. The 22 programs, each of which require practically all storage available, are compiled and integrated to form a system by carrying pertinent data forward, from one program to another. The programs determine maximum bending moments, shears and reactions at numerous points on the structures due to live load, dead load, wind loads, and longitudinal forces. These results are printed along with the maximum combinations of moments and shears for loading Groups I, II and III as provided for in the AASHO specification. Longitudinal steel areas, stirrup sizes and spacings are computed. In addition, an influence line program is included which determines coefficients for bending moments at quarter points of a four span continuous girder. The influence line ordinates are determined for a unit load applied at the tenth points of the four spans.
PB-173 863 HC$3.00 MF$0.65

STUDY OF LONG-TERM DEFORMATION OF COMPACTED COHESIVE SOIL EMBANKMENTS.
Ohio State Univ., Columbus. Transportation Engineering Center.
For primary bibliographic entry see Field 8M.
PB-173 924 HC$3.00 MF$0.65

TRAFFIC LINKAGE PATTERNS BETWEEN A METROPOLITAN AREA AND THE COMMUNITIES WITHIN ITS REGION OF INFLUENCE,
Illinois Univ., Urbana. Engineering Experiment Station.
George W. Greenwood. 11 Aug 65, 244p ILU-EES-Bull-488
Prepared in cooperation with Bureau of Public Roads, Washington, D. C.

Descriptors: (*Traffic, Models (Simulations)), (*Urban planning, Traffic), Urban areas, Transportation, Population, Economics, Roads, Passenger vehicles, Cargo vehicles, Factor analysis.

The primary objective of this study is to develop models for analyzing vehicular traffic as one form of intercommunity linkage. Of particular concern are traffic linkage relationships that exist between Champaign-Urbana and communities located within a fourteen county area of East-Central Illinois. The models were structured from data obtained from a 1958 origin and destination study of the Champaign-Urbana metropolitan area. The techniques employed in analyzing these data are multiple regression and factor analysis. The basic gravity model was expanded for regional analysis by (1) assuming that a condition of competitive interaction exists among communities of a region and (2) by considering not only the total traffic flow among communities, but instead the ability of each to attract or produce trips. The independent variables included measures of community attractiveness (e.g., population, employment, sales, etc., and time distance in minutes). Various mathematical transformations (i.e., first, second, third powers and square roots) were assigned to each of the independent variables. The dependent variables were vehicle trips and person trips. The high degree of intercorrelation between them, however, indicated that it was not necessary that they be analyzed separately.
PB-173 958 HC$3.00 MF$0.65

OPTICAL PROPERTIES AND VISUAL EFFECTS OF SMOKE-STACK PLUMES,

National Center for Air Polution Control, Cincinnati, Ohio.
William D. Conner, and J. Raymond Hodkinson. 1967. 95p
PHS-Pub-999-AP-30
Prepared in cooperation with Virginia State Coll., Petersburg. Dept. of Physics.

Descriptors: (*Waste gases, Optical properties), (*Smokes, Optical properties), Air pollution, Test methods, Visual inspection, Standards, Meters, Optical instruments, Illumination, Particle size, Aerosols.

Two experimental smoke stacks were constructed to provide test plumes for studies of optical properties and visual effects over a wide range of illuminating and viewing conditions. Results indicate that visual effects are not intrinsic properties of the plumes but vary with the background of the plume and with illuminating and viewing conditions. Variation was much greater with white plumes than with black. Tests conducted with trained smoke inspectors showed that their evaluations of nonblack smoke plumes were significantly influenced by these variations. The angular scattering and transmission characteristics of the experimental plumes were measured and estimates of particle size derived therefrom. The study shows that the quantity of aerosols in a plume is best evaluated optically by its transmittance. Special methods for measuring the transmittance of smoke plumes objectively are discussed. The methods involve telephotometry, photography, and photometry of targets; the use of smoke guides; and laser measurements. (Author)
PB-174 705 HC$3.00 MF$0.65

SOURCES OF POLYNUCLEAR HYDROCARBONS IN THE ATMOSPHERE,
National Center for Air Pollution Control, Cincinnati, Ohio.
R. P. Hangebrauck, D. J. von Lehmden, and J. E. Meeker. 1967. 51p
PHS-Pub-999-AP-33

Descriptors: (*Air pollution, Sources), (*Polycyclic compounds, Air pollution), (*Hydrocarbons, Air pollution), (*Waste gases, Polycyclic compounds), Wastes (Industrial), Combustion products, Exhaust gases, Emissivity, Measurement, Sampling, Statistical analysis.
Identifiers: Benzopyrenes.

Rates of emissions of polynuclear hydrocarbons were measured at several sources considered likely to produce such emissions. The sources included heat generation by combustion of coal, oil, and gas; refuse burning; industrial processes; and motor vehicles. The annual emissions of benzo (a)pyrene in the United States were estimated for each of the sources surveyed, to provide a rough gauge of the importance of each source. Small, inefficient residential coal-fired furnaces appear to be a prime source of polynuclear hydrocarbons; other sources may be of local importance. Production of polynuclear hydrocarbons was generally associated with conditions of incomplete combustion. (Author)
PB-174 706 HC$3.00 MF$0.65

EMISSIONS FROM COAL-FIRED POWER PLANTS: A COMPREHENSIVE SUMMARY,
National Center for Air Pollution Control, Cincinnati, Ohio.
Stanley T. Cuffe, and Richard W. Gerstle. 1967. 33p
PHS-Pub-999-AP-35

Descriptors: (*Power plants (Establishments), *Waste gases), (*Air pollution, Power plants (Establishments)), Combustion products, Sulfur compounds, Oxides, Nitrogen oxides, Polycyclic compounds, Hydrocarbons, Particles, Formaldehyde, Carboxylic acids, Arsenic, Carbon monoxide, Coal.

A study was conducted on air pollutant emissions from the six main types of coal-burning power plants. The components tested include sulfur oxides, nitrogen oxides, polynuclear hydrocarbons, total gaseous hydrocarbons, solid particulates, formaldehyde, organic acids, arsenic, trace metals, and carbon monoxide. The report relates the effects of variables such as method of operation, type of boiler furnace and auxiliaries, reinjection of fly ash, and type of coal burned to the concentrations of gaseous and particulate pollutants in the products of combustion. (Author)
PB-174 708 HC$3.00 MF$0.65

CLIMATOLOGY OF STAGNATING ANTICYCLONES EAST OF THE ROCKY MOUNTAINS, 1936-1965,
National Center for Air Pollution Control, Cincinnati, Ohio.
For primary bibliographic entry see Field 4B.
PB-174 709 HC$3.00 MF$0.65

STABILIZATION OF SILTY SOILS IN ALASKA-PHASE II,
Alaska Univ., College. Arctic Environmental Engineering Lab.
H. R. Peyton, C. F. Kennedy, and J. W. Lund. Apr 67. 66p
Prepared in cooperation with Bureau of Public Roads, Washington, D. C. See also PB-173 024 and PB-173 041.

Descriptors: (*Soil mechanics, *Silt), (*Alaska, Soil mechanics), Membranes, Foundations (Structures), Roads, Soils, Additives, Freezing, Deformation, Protective treatments, Stabilization, Cements, Sodium compounds, Phosphates, Plastics.
Identifiers: Sodium polyphosphate.

The report concerns study of prevention of frost heave and loss of strength on thawing of silt or loess soils of the A-4 type used for highway construction in Alaska. Data on the effects of portland cement, tetra sodium pyrophosphate (TSPP), calcium chloride, sodium hydroxide, tri sodium phosphate and plastic membranes on the heave rate, have ratio, frost penetration, permeability, and the after thaw CBR are presented. Tetra sodium pyrophosphate (TSPP) was the only chemical which effectively reduced permeability. TSPP at 0.5 percent rate and sodium hydroxide at 0.3 percent rate were the most effective treatments for control of frost heave. TSPP treatment costs about $2.00 per cubic yard and NaOH treatment about $1.70 per cubic yard. Providing a closed system by use of a plastic membrane also proved successful. (Author)
PB-174 727 HC$3.00 MF$0.65

PROCEEDINGS: PROGRAM REVIEW MEETING: RESEARCH AND DEVELOPMENT OF TRAFFIC SYSTEMS, DECEMBER 6, 7, AND 8, 1966, GAITHERSBURG, MD.
Bureau of Public Roads, Washington, D. C.
Dec 66. 425p

Descriptors: (*Traffic, Symposia), (*Passenger vehicles, *Transportation), Roads, Urban areas, Maneuverability, Control systems, Motor vehicle operators, Communication systems, Optimization, Analysis, Energy conversion, Systems engineering.

Contents: Vehicle control in overtaking and passing maneuvers; Energy absorption as related to highway system modification; Improving reliability of urban intersection movements; Driving control processes; Effects of environmental factors on traffic operations; Improved utilization of interchanges; Analysis and control of traffic flow on urban freeways; Highway communications; Optimization of flow on urban networks.
PB-174 746 HC$3.00 MF$0.65

A WAY TO REDUCE HIGHWAY GUARDRAIL COSTS: MACHINE-DRIVING OF WOODEN POSTS.
Research paper,
Northeastern Forest Experiment Station, Upper Darby, Pa.
Charles J. Gatchell. 1967. 24p RP-NE-81

Descriptors: (*Roads, *Costs), (*Machines, Roads), Wood, Road-building equipment, Safety, Protection, Site selection, Manpower, Physical properties, Tests.

The study was done to determine whether a finished line of guardrail posts could be installed rapidly with the new driver. For a realistic test, conditions typical of an actual guardrail post installation job were required. In addition to speed, it is necessary that guardrail posts be installed to specified tolerances. Therefore, posts were installed to meet the specifications of the State Road Commission of West Virginia for plumbness, alignment, spacing, and freedom from damage. Main objectives in the study were: To compare the effectiveness of driving on a variety of sites. To compare the rates of installation by machine-driving and by the conventional hand-setting method. To evaluate the effect of post cross-sectional area on driving time.
PB-174 774 HC$3.00 MF$0.65

SHORT COURSE ON ROADSIDE DEVELOPMENT (23rd).
Course held 5-9 Oct 64.
Ohio State Univ., Columbus. Dept. of Landscape Architecture.
9 Oct 64. 184p
Prepared in cooperation with Ohio Dept. of Highways, Columbus.

Descriptors: (*Roads, *Education), (*Design, *Plants (Botany)), Recreation, Natural resources, Australia, Management planning, Seeds, Great Britain, Urban areas, Drainage, Maintenance, Illinois, Glass textiles, Erosion, Grasses, Herbicides.

Contents: Critique of the landscape plans for highway ecology; The importance of local parks to tourist travel; Parks in Australia; Parade magazine's competitive scenic highway contest; The highway administrator and roadside development; Hydraulic seeding on motorway, verges and other marginal areas as practiced in England; Proaesthetics; Visual approach to urban areas; Contour grading and drainage plans for integrated highway design; Instrumentation and techniques for research in roadside development; A highway planting program in Illinois; Comparison of fiber glass and other mulch materials for erosion control; Vegetation control in the Ohio highway research project; Method practiced to reduce roadside turf maintenance costs; Optimum selection and assignments of roadside mowers.
PB-174 802 HC$3.00 MF$0.65

SHORT COURSE ON HIGHWAY DEVELOPMENT (2nd).
Course held 27-8 Feb 42.
Ohio State Univ., Columbus. Dept. of Landscape Architecture .
28 Feb 42. 60p
Prepared in cooperation with Ohio Dept. of Highways, Columbus.

Descriptors: (*Roads, *Education), (*Design, *Plants (Botany)), Organizations, Electric wire, Trees, Traffic, Safety, Rural areas, Maintenance, Costs.

Content: Design of highway sections for war and post war needs; True values in roadside development; The educational values of lay organizations; landscape architect; Coordination of roadside development and overhead lines; The landscape ar-

chitects work in relation to the complete highway project; Trees - their care, preservation and plantings; The promotion of safety on the highway; The viewpoint of the nurseryman and the landscape contractor; Safety in design; Collaborative overlaps in county planning; Maintenance - the protection of the highway investment; Notes on flight strips.
PB-174 803 HC$3.00 MF$0.65

SHORT COURSE ON HIGHWAY DEVELOPMENT (4th).
Course held 10-11 Mar 44.
Ohio State Univ., Columbus. Dept. of Landscape Architecture.
11 Mar 44, 93p
Prepared in cooperation with Ohio Dept. of Highways, Columbus.

Descriptors: (*Roads, *Education), (*Design, *Plants (Botany)), History, Rural areas, Aerial photographs, Soil mechanics, Connecticut, Maintenance, Natural resources, Recreation, Traffic.

Content: The complete highway as it concerns the public; Historical sites and structures as they relate to the highway system; The complete highway as it concerns the farm family; Post war highway work as it pertains to the nursery industry; The importance of highway research during the war; The complete highway as it concerns the engineer and the landscape architect; Aerial photographs and soil engineering; Conservation of land and landscape values in highway construction; The public relations value of roadside development; Roadsides of Connecticut and their maintenance; State parks and parkways and the post-war program; An educational program for the complete highway; Technical education as seen by the landscape architect; Education for roadside development; Education in landscape architecture; Landscape specifications in highway construction.
PB-174 804 HC$3.00 MF$0.65

SHORT COURSE ON HIGHWAY DEVELOPMENT (7th).
Course held 11-2 Feb 48.
Ohio State Univ., Columbus. Dept. of Landscape Architecture.
12 Feb 48, 115p
Prepared in cooperation with Ohio Dept. of Highways, Columbus.

Descriptors: (*Roads, *Education), (*Design, *Plants (Botany)), Traffic, Safety, Herbicides, Sprays, History, Trees, Grasses, Fertilizers, Recreation, Urban areas, Rural areas, Natural resources.

Content: The place of highway cross section design and development in the problem of road safety; The latest developments in weed control with chemicals; Planning, zoning and public relations; Landscape design in roadside development; As the layman and conservationist looks at roadside development; Notes on the blue star memorial highway; Training tree-pruning personnel, with sidelights on meeting the public; Fertilizer, limes, mulches - their part in establishing roadside vegetation; Panel discussion - how some of the roadside development problems are being solved throughout the country.
PB-174 805 HC$3.00 MF$0.65

SHORT COURSE ON HIGHWAY DEVELOPMENT (8th).
Course held 23-4 Mar 49.
Ohio State Univ., Columbus. Dept. of Landscape Architecture.
24 Mar 49, 128p
Prepared in cooperation with Ohio Dept. of Highways, Columbus.

Descriptors: (*Roads, *Education), (*Design, *Plants (Botany)), Natural resources, Recreation, Drainage, Rural areas, Herbicides, Sprays, Trees, Urban areas, Traffic, Asphalt, Bituminous coatings, Erosion, Grasses, Bridges.

Contents: Educating and training the undergraduate; In-service training programs for the presentation of landscape principles and objectives in highway work; Main highways to good speech; Highways for use and enjoyment; Latest developments in drainage, for application to roadside problems; Construction and maintenance of park walks, drives and turnouts; Parking and access problems on rural roads; Zoning as it effects a state, county, and township and their highways; Weed, poison ivy and brush control with chemicals; Trees for streets and highways, and their care; Trees as an element in highway land damage.
PB-174 806 HC$3.00 MF$0.65

SHORT COURSE ON ROADSIDE DEVELOPMENT (9th).
Course held 22-23 Mar 50.
Ohio State Univ., Columbus. Dept. of Landscape Architecture.
23 Mar 50, 123p
Prepared in cooperation with Ohio Dept. of Highways, Columbus.

Descriptors: (*Roads, *Education), (*Design, *Plants (Botany)), Grasses, Seeds, Asphalt, Erosion, Traffic, Safety, Natural Resources, Recreation, Trees, Maintenance, Soil mechanics, Rural areas, Visual signals, Vehicles.

Contents: Making better use of existing highways; A farm woman's viewpoint of roadside improvement; Highway planting design; Developing a good highway program and the extent to which roadside development can fit into it; Safe driving; Roadside control or roadside chaos; Conservation of the roadsides; Seeding the roadsides; Straw mats for erosion control; Other states' contribution to roadside development.
PB-174 807 HC$3.00 MF$0.65

SHORT COURSE ON HIGHWAY DEVELOPMENT (5th).
Course held 27-28 Feb 41.
Ohio State Univ., Columbus. Dept. of Landscape Architecture.
28 Feb 46, 112p
Prepared in cooperation with Ohio Dept. of Highways.

Descriptors: (*Roads, *Education), (*Design, *Plants (Botany)), Trees, Herbicides, Sprays, Recreation, Birds, Grasses, Fertilizers, Seeds, Erosion, Asphalt, Urban areas, Lighting equipment.

Content: Parks and picnic areas as living memorials; Roadside tree pruning; Roadside trees and public relations; Tree care and preservation during grading and construction operations; Weed control by chemical treatment; Highways as access to recreational areas; Our birds in their home surroundings; Growing grasses under existing and made roadside conditions; Roadside fertilization experiments; New developments in roadside seeding and maintenance equipment; New developments in the use of asphalt in control of erosion; Practical use of asphalt emulsions as a seeding mulch; The relation between city, inter-regional and belt line planning; Styles in highway design; Highway, boulevard and street lighting.
PB-174 810 HC$3.00 MF$0.65

SHORT COURSE ON ROADSIDE DEVELOPMENT (6th).
Course held 13-14 Feb 47.
Ohio State Univ., Columbus. Dept. of Landscape Architecture.
14 Feb 47, 106p
Prepared in cooperation with Ohio Dept. of Highways, Columbus.

Descriptors: (*Roads, *Education), (*Design, *Plants (Botany)), Herbicides, Sprays, Trees, Photography, Asphalt, Maintenance, Costs, Economics, Seeds, Law, Management planning, Fertilizers, Road-building equipment, Ohio.

Contents: Insecticides and Germicides; Weed control by chemical treatment; Shade tree disease research; The technical approach to good photography; Photographic composition; On-th-job-training; Further developments and uses of Asphalt emulsions in seeding operations; The latest in specifications covering landscape development operations; Something new in roadside operations equipment; Practical equipment for roadside construction and maintenance operations; Right-of-way control in relation to location; Right-of-way control in relation to economic and legal problems in land acquisition and protection; Right-of-way control in relation to construction and maintenance problems in land conservation and management. (Author)
PB-174 811 HC$3.00 MF$0.65

SHORT COURSE ON ROADSIDE DEVELOPMENT (10th).
Course held 4-7 Apr 51.
Ohio State Univ., Columbus. Dept. of Landscape Architecture.
7 Apr 51, 194p
Prepared in cooperation with Ohio Dept. of Highways, Columbus.

Descriptors: (*Roads, *Education), (*Design, *Plants (Botany)), Trees, Herbicides, Sprays, Grasses, Maintenance, Organizations, Natural resources, Erosion, Tables, Maps, Costs, Economics, Recreation, Ohio.

Content: Ten years of advancement in roadside development; Roadside use has a part in the conservation program; Utility line maintenance within the highway right of way; What organizations can offer to roadside development; Advancement in erosion control protection by seeding and mulching; Advancement in the use of woody plants; Advancement in the use of ground covers; Advancement in the use of chemicals and equipment for chemical weed control; Advancement in the construction and maintenance of roadside parks.
PB-174 812 HC$3.00 MF$0.65

SHORT COURSE ON ROADSIDE DEVELOPMENT (11th).
Course held 2-5 Apr 52.
Ohio State Univ., Columbus. Dept. of Landscape Architecture.
5 Apr 52, 190p
Prepared in cooperation with Ohio Dept. of Highways, Columbus.

Descriptors: (*Roads, *Education), (*Design, *Plants (Botany)), Soils, Trees, Erosion, Maintenance, Organizations, Grasses, Seeds, Natural resources, Costs, Recreation, Herbicides, Sprays, Fertilizers, Economics, Ohio.

Content: Panel on use of turf in soil stabilization of shoulders, slopes and ditches; Summation of information gathered to date on stabilized turf shoulders; Tests and recommendations for stabilized turf shoulders; Turf problems on stabilized shoulders; Construction of stabilized turf shoulders with mechanized equipment; Erosion control in engineering works; Mechanized equipment and methods of roadside development and maintenance; Highway trees; Trees - their place and part in the complete highway; The cultural development of roadside trees; Protection with pentachlorophenol; Roadside management; Roadside councils - their power and possibilities; Microclimates along the highways; Liquid fertilizer as applicable to roadside management; Krilium soil conditioner-Preliminary results of field erosion control tests;

Construction of the complete highway model as displayed at the eleventh short course on roadside development. (Author)
PB-174 813 HC$3.00 MF$0.65

SHORT COURSE ON ROADSIDE DEVELOPMENT (12th).
Course held 6-9 Oct 53.
Ohio State Univ., Columbus. Dept. of Landscape Architecture.
9 Oct 53, 133p
Prepared in cooperation with Ohio Dept. of Highways, Columbus.

Descriptors: (*Roads, *Education), (*Design, *Plants (Botany)), Recreation, Structures, Economics, Prefabricated buildings, Erosion, Hydraulic systems, Grasses, Seeds, Herbicides, Sprays, Ohio.

Contents: Roadside parks; Prefabricating Ohio roadside park structures; A plan for limited production of inexpensive visual materials; The role of the roadside council in the development of the Ohio highways; Roadside park competition problem; Modern conservation and the highway roadside; Conservation; Treatment of borrow pits adjacent to the highway right of way; Grasses - an economical approach to erosion control; The design of Ohio construction projects for erosion control by hydraulic methods; Progress report on grass inhibitors for highway areas; Developments in highway weed control with chemicals; The promise of seed disinfectants for roadside use. (Author)
PB-174 814 HC$3.00 MF$0.65

SHORT COURSE ON ROADSIDE DEVELOPMENT (13th).
Course held 5-8 Oct 54.
Ohio State Univ., Columbus. Dept. of Landscape Architecture.
8 Oct 54, 119p
Prepared in cooperation with Ohio Dept. of Highways, Columbus, Ohio.

Descriptors: (*Roads, *Education), (*Design, *Plants (Botany)), Trees, Erosion, Urban areas, Maintenance, Fertilizers, Public opinion, Universities, Trees, Economics, Ohio.

Contents: Design; Tailored trees for highway use; Relations with adjacent property owners on water conservation and erosion control; Controlled access of the highway as it relates particularly to the urban fringe; The complete highway - a boon to road users; Maintenance; Sanitation in rest areas; Conservative cutting for views along highways; Planning a contract weed control program; A logical approach to clearing the right of way; Education; New fertilizers and techniques for application to the roadside; Educating the public in the use of public properties; The universities' contribution to roadside development; A plan to stimulate public interest in Ohio's roadside program; Highway planting design and the public. (Author)
PB-174 815 HC$3.00 MF$0.65

SHORT COURSE ON ROADSIDE DEVELOPMENT (14th).
Course held 4-7 Oct 55.
Ohio State Univ., Columbus. Dept. of Landscape Architecture.
7 Oct 55, 150p
Prepared in cooperation with Ohio Dept. of Highways, Columbus, Ohio.

Descriptors: (*Roads, *Education), (*Design, *Plants (Botany)), Urban areas, Transportation, Soils, Recreation, Bituminous coatings, Grasses, Fertilizers, Costs, Tables, Rural areas, Canada, New York, Ohio.

Contents: Conservation; The urban by-pass an essential conservation measure; Promoting the anti-litter campaign; Assisting Ohio's roadside park and planting problem; The district landscape architect views roadside development in New York State; The division landscape architect views roadside development in Ohio; New frontiers and transportation; The place of roadside development in the complete highway; Utility problems within highway rights-of-way; Canada's capital - the plan and development; Introductory remarks: Management and maintenance; Soil management; Picnic fireplaces for public parks; New techniques in turf establishment; Bituminbus adhesives for vegetative mulch. (Author)
PB-174 816 HC$3.00 MF$0.65

SHORT COURSE ON ROADSIDE DEVELOPMENT (15th).
Course held 2-5 Oct 56.
Ohio State Univ., Columbus. Dept. of Landscape Architecture.
5 Oct 56, 232p
Prepared in cooperation with Ohio Dept. of Highways, Columbus.

Descriptors: (*Roads, *Education), (*Design, Plants (Botany)), Fertilizers, Costs, Herbicides, Sprays, Trees, Natural resources, Grasses, Seeds, Tables, Maps, Urban areas, Rural areas, Erosion, Management planning, Ohio.

Contents: The role of parkways in modern transportation; What plant material should so as highway planting; Ohio's development depends upon conservation; Critique of the roadside planting problem; Roadside development costs; Turf management on roadsides; Grasses - their selection and establishment; Herbicides - their uses and purposes for rights of way; Fertilizers - their contribution toward good turf; Types and values of mulch in establishing turf on roadsides; Vegetative mulch for roadside seeding; Chemical additives for erosion control; Asphalts - their selection and use as a mulch; The highway and the local community; Promoting roadside development in the area program; Controlled water on lands adjacent to the highway. (Author)
PB-174 817 HC$3.00 MF$0.65

SHORT COURSE ON ROADSIDE DEVELOPMENT (16th).
Course held 8-11 Oct 57.
Ohio State Univ., Columbus. Dept. of Landscape Architecture.
11 Oct 57, 129p
Prepared in cooperation with Ohio Dept. of Highways, Columbus.

Descriptors: (*Roads, *Education), (*Design, *Plants (Botany)), Fertilizers, Costs, Herbicides, Trees, Sprays, Natural resources, Grasses, Seeds, Tables, Maps, Texas, Erosion, Mississippi, Organizations, Ohio.

Contents: Highway aesthetics; Protecfing and salvaging of roadside trees and other scenic features; Roadside development in Texas; The Mississippi River Parkway; Planning a keep Ohio beautiful organization; Critique of the roadside park design problem; En route to roadside development; Planning and the role of the landscape architect in the interstate highway program; Roadside protection; Highway aesthetics--The National Park Service viewpoint; Rates of seeding and five year summary of establishment of crown vetch; Uses and availability of grasses for roadside improvement projects; Work and plans of subcommittee on chemicals; Roadside equipment for economical operations. (Author)
PB-174 818 HC$3.00 MF$0.65

SHORT COURSE ON ROADSIDE DEVELOPMENT (17th).
Course held 7-10 Oct 58.
Ohio State Univ., Columbus. Dept. of Landscape Architecture.
10 Oct 58, 161p
Prepared in cooperation with Ohio Dept. of Highways, Columbus.

Descriptors: (*Roads, *Education), (*Design, *Plants (Botany)), Fertilizers, Costs, Herbicides, Traffic, Safety, Recreation, Natural resources, Grasses, Seeds, Tables, Maps, Erosion, Canada, Kansas, Ohio.

Content: Safety and planting; Highway safety research project; New trends in planting design; The nurseryman views the interstate highway p rogram; Roadside rests; Critique of the landscape plans for a large traffic interchange on the interchange system; The highway in a program for recreation in America; Roadside improvement program in Kansas; Coordinating the work of engineer and landscape architect; The desirability of aesthetic values in highway design; A new look at Canada's parks; Control of roadside vegetation; Balanced roadside seeding; Control of water flow through vegetative linings; Herbicide toxicity; Insect control of importance to roadside development; Trends in line clearance. (Author)
PB-174 819 HC$3.00 MF$0.65

SHORT COURSE ON ROADSIDE DEVELOPMENT (18th).
Course held 6-9 Oct 59.
Ohio State Univ., Columbus. Dept. of Landscape Architecture.
9 Oct 59, 168p
Prepared in cooperation with Ohio Dept. of Highways, Columbus.

Descriptors: (*Roads, *Education), (*Design, *Plants (Botany)), Trees, Grasses, Standards, Herbicides, Costs, Safety, Rural areas, Sprays, Urban areas, Erosion, Tables, Seeds, Canada, Puerto Rico, Ohio.

Contents: Developments in design; Indirect benefits derived from an anti-litter campaign; Today's design for tomorrow's standards; Trees as reviewed by the professional arborist; Puerto Rico and its roadside improvement program; Critique of the landscape plans for an approach planting; Roadside safety; A design engineer's ideas on roadside development; Canada's highways; Design for variety to reduce monotony, increase safety and minimize maintenance; Recent experimental data on crash barriers; Maintaining the right of way; Roadside equipment for economical operation; New thoughts for roadside rest toilet design; New developments in HERBICIDES FOR ROADSIDE MAINTENANCE; Significance of insect control in the highway program. (Author)
PB-174 820 HC$3.00 MF$0.65

SHORT COURSE ON ROADSIDE DEVELOPMENT (19th).
Course held 4-7 Oct 60.
Ohio State Univ., Columbus. Dept. of Landscape Architecture.
7 Oct 60, 165p
Prepared in cooperation with Ohio Dept. of Highways, Columbus.

Descriptors: (*Roads, *Education), (*Design, *Plants (Botany)), Bridges, Recreation, Urban areas, Inland waterways, Grasses, Sand, Erosion, Herbicides, Sprays, Fertilizers, Seeds, Natural resources, Safety, Traffic.

Content: Good public relations must precede successful roadside protection; The crisis for public recreational areas; The role of information dispersement centers in our highway program; Land control at interchanges for the interstate highway system; Critique of the landscape plans for an interstate highway planting design; Latest development of the great river road program; Highway landscape development standards; Coordinating a successful county and state landscape program of urban highways; The establishment of vegetation lined waterways; An aid to establishing vege-

tation in waterways; Roadside cover and its control; The use of native midwestern grasses for highway purposes; Establishment of cover on poor soil and stabilization of sand through the use of vegetation mulch; Principles in use of sod for erosion control; Use of inhibitors; Roadside vegetation control and the public; Safe uses of herbicides on right-of-way and other noncrop areas.
PB-174 821 HC$3.00 MF$0.65

SHORT COURSE ON ROADSIDE DEVELOPMENT (24th).
Course held 4-8 Oct 65.
Ohio State Univ., Columbus. Dept. of Landscape Architecture.
8 Oct 65, 162p
Prepared in cooperation with Ohio Dept. of Highways, Columbus.

Descriptors: (*Roads, *Education), (*Design, *Plants (Botany)), Canada, Seeds, Grasses, Wastes (Sanitary engineering), Trees, Natural resources, Costs, Great Britain, Herbicides, Sprays, Organizations, Urban areas, Rural areas, Fertilizers.

Content: Camping on the interstate system; Camping in Canada; Critique of camping design; Is your community showing; Basic problems of water and sewerage in public parks; Progress in highway development; How to get a good buy on good seed for roadside seeding; Planting Britain's motorways; What American nurserymen association means to highways; Timing of seeding throughout the growing season; Refertilization of established roadside slopes; MH-30 and the control of terminal tree growth; City; Planting; State in the overall contract planting; The highway beautification program.
PB-174 825 HC$3.00 MF$0.65

13C. CONSTRUCTION EQUIPMENT, MATERIALS, AND SUPPLIES

CUT-AND-COVER TRENCHING IN SNOW.
Snow Ice and Permafrost Research Establishment Wilmette Ill
For primary bibliographic entry see Field 8L!
AD-652 713 HC$3.00 MF$0.65

ULTIMATE STRENGTH OF CHOPPED WIRE REINFORCED SMALL SCALE MORTAR SLABS.
Final rept.,
Protective Structures Development Center Fort Belvoir Va
Herbert C. Lamb, and Michael M. Dembo. Jan 67, 56p Rept no. PSDC-TR-19

Descriptors: (*Reinforced concrete, Mechanical properties), Wire, Failure (Mechanics), Thickness, Loading (Mechanics), Construction materials.

Small scale concrete slabs reinforced with chopped wire were tested to determine ultimate strength and failure mechanism. Special techniques for adding the chopped wire were required to obtain a uniform and workable mix. Best results were obtained by blowing the 0.5 inch lengths of 6 mil wire into the mixer as the wire was sifted slowly through a screen. Three slabs were cast at Carnegie Institute of Technology and shipped to the PSDC for testing and eight were cast at the PSDC. The nominal thickness of the test slabs varied from 1/2 to 3/4 inch. All slabs were 30 inches square and supported on rollers at 29-1/4 inches. Uniformly distributed static loads were applied using a vacuum loading apparatus. Increasing the reinforcement from 2% to 4% by volume did not increase the strength of the slabs. Slabs containing 2% reinforcement had greater ultimate strength than predicted while those with 0% and 4% failed at lower than predicted loads. (Author)
AD-652 884 HC$3.00 MF$0.65

13D. CONTAINERS AND PACKAGING

REPORT OF THE 51 ST NATIONAL CONFERENCE ON WEIGHTS AND MEASURES, 1966,
National Bureau of Standards, Washington, D.C.
L. J. Chisholm. 15 May 67, 205p

Descriptors: (*Weight, Standards), (*Measurement, Standards), Hawaii, Performance (engineering), Symposia, Packaging, Labels, Law, Fuel pumps, Tolerances (mechanics), Acceptability.

The 51st National Conference on Weights and Measures (1966) was sponsored by the National Bureau of Standards. It was attended by officials from the various states, counties, and cities, and by representatives from U.S. Government, Industry, and Consumer Organizations. It included various addresses, committee reports, seminars, and papers concerning problems, progress, and goals in the area of weights and measures.
NBS-Misc-Pub-290 HC$1.00 MF$0.65

13E. COUPLINGS, FITTINGS, FASTENERS, AND JOINTS

PROTECTIVE SHIPPING PACKAGES FOR 30-INCH-DIAMETER UF CYLINDERS,
Oak Ridge Gaseous Diffusion Plant, Tenn.
For primary bibliographic entry see Field 18H.
For abstract, see NSA 21 12.
K-1686 HC$3.00 MF$0.65

DETECTION OF PLUTONIUM PENETRATIONS THROUGH CONTAINERS AT HIGH TEMPERATURE,
Los Alamos Scientific Lab., N. Mex.
For primary bibliographic entry see Field 18J.
For abstract, see NSA 21 12.
LA-3654 HC$3.00 MF$0.65

TEST OF BACN10EL NUTPLATE.
Boeing Co., Seattle, Wash. Launch Systems Branch.
J. F. Hart. 30 Dec 66, 7p NASA-CR-84462, T5-6539-84
Contract NAS8-5608

Descriptors: *Function test, *Metal plate, *Saturn s- ic stage, Compliance, Dimension, Function, Metal, Nut, Plate, Specification, Standard, Strength, Tensile, Test, Thread, Torque.

For abstract, see STAR 05 14.
N67-27501 HC$3.00 MF$0.65

13F. GROUND TRANSPORTATION EQUIPMENT

MOBILITY ENVIRONMENTAL RESEARCH STUDY ONE-PASS PROGRAM.
Technical rept.,
Army Tank-Automotive Center, Warren, Mich. Land Locomotion Lab.
Peter W. Haley. Jan 65, 66p LL-101
ATAC-TR-8785

Descriptors: (*Mobility, *Vehicles), (*Soil mechanics, Vehicles), Performance (Engineering), Environmental tests, Mechanical properties, Accuracy, Equations, Friction, Tables, Photographs.

The overall purpose of this program was to develop a quick, accurate, prediction for one-pass performance of a vehicle operating in fine-grained soft soil conditions and a slippery soil layer over a hard-pan. The specific objective was to predict performance using existing analytical Land Locomotion Mechanics expressions as a datum for new relationships. Performance curves of drawbar-pull vs slip were constructed from measured vehicle tests and on the basis of measured Land Locomotion Mechanics Soil Values. Coefficient of friction values were obtained for the slippery soil layer condition in the same manner. Predicted performance for the vehicles tested was within the accuracy level of 25% (that is expected from Land Locomotion Mechanics prediction techniques) for 55% of the tests conducted. The remaining 45% of the test results indicated the need, in some instances, for more realistic test techniques with regard to the vehicle test and soil data collection. A quick-data reduction procedure for predicting performance cannot be readily obtained. (Author)
D-467 165 HC$3.00 MF$0.65

AERODYNAMIC DRAG ON VEHICLES IN ENCLOSED GUIDEWAYS.
Rept. for Sep 64-Sep 66,
Massachusetts Inst. of Tech., Cambridge. Engineering Projects Lab.
S. William Gouse, Jr., and Joseph Nwude. 6 Dec 66, 59p DSR-76108-1
Contract C85-65
Rept. on Proj. Transport. See also PB-173 647.

Descriptors: (*Drag, *Vehicles), (*Propulsion, Transportation), Acceleration, Potential theory, Vehicles, Laminar flow, Differential equations, Momentum, Turbulence, Power, Mach number, Velocity, Special functions (Mathematical), Cylindrical bodies.
Identifiers: Transport project, HS6T (High speed ground transport).

The purpose of this study was to investigate the aerodynamic drag on vehicles moving in enclosed guideways. The reason for the study was, and is, that several potential high-speed ground-transport system concepts involve high-speed motion of vehicles in enclosed guideways for significant portions of their travel time. Both analytical and experimental studies have been carried out. The analytical studies commenced by developing a solution for the aerodynamic drag on a vehicle in an enclosed guideway in laminar flow. This analysis was based on an analogy, first suggested by Rayleigh, that exists between the governing equations for unsteady flow resulting when an infinite body is started impulsively from rest and for the steady flow that results from steady motion of a semi-infinite body. The results of this analysis for laminar flow provided a base from which to begin, and were then used in an attempt to predict the drag that would result in turbulent flow. The turbulent flow analytical estimate was based on another approximation or analogy which assumes that for any turbulent flow there exists a laminar flow in which corresponding streamlines in the laminar flow can be found to enclose the turbulent wake in the turbulent flow, and that by making use of an effective eddy viscosity in the laminar flow solution, one can predict the drag coefficient in the corresponding turbulent flow. (Author)
PB-173 646 HC$3.00 MF$0.65

GENERAL VEHICLE DYNAMIC MODEL,
Massachusetts Inst. of Tech., Cambridge. Engineering Projects Lab.
Igor L. Paul, Hariharan Sankaran, and James J. Jackson. Nov 66, 189p DSR-76109-3
Contract C-85-65

Descriptors: (*Dynamics, *Vehicles), Velocity, Roll, Acceleration, Computer programs, Pitch (Motion), Yaw, Ground speed, Tests.

Two computer programs were developed to calculate the three-dimensional dynamics of a rigid high-speed ground-vehicle supported vertically and la-

terally by an arbitrary number of suspensions and excited by arbitrary inputs (acting on the suspensions or on the vehicle body). The first program models each suspension by a linear spring and damper in parallel connected to the unsprung mass and another linear spring and damper in parallel joining the unsprung mass and the vehicle. This model is applicable to a limited class of suspensions over their linear operating range. The second, much more comprehensive program permits non-linear and/or 'active' suspension elements. Each suspension can consist of masses connected (in series or parallel) by elements with force characteristics which can be any function of time or of the relative or absolute displacements, velocities or accelerations of any of the masses (including the vehicle mass). Both programs accept sinusoidal, step, ramp or arbitrary function inputs to the suspensions and print out any or all of the following vehicle response parameters as a function of time: vertical and lateral displacement, velocity and acceleration of the vehicle center of mass; vehicle roll, pitch and yaw (and their first and second derivatives); suspension forces on the vehicle and on the guideway. (Author)
PB-173 650 HC$3.00 MF$0.65

EVALUATION OF BUS TRANSIT DEMAND IN MIDDLE-SIZED URBAN AREAS, VOLUME I.
Final rept. on Phase 1.
Smith (Wilbur) and Associates, New Haven, Conn.
1966, 308p
Contract CPR-11-1849
See also PB-173 666.

Descriptors: (*Passenger vehicles, Urban areas), (*Urban areas, Transportation), Population, Mobility, Statistical analysis, Traffic, Costs, Motivation, Attitudes.

The urbanized area is almost desperately dependent on the efficient functioning of its transport system. The transportation specialists who are responsible for the effective administration of these systems face both challenge and opportunity in perfecting and extending transport services in their communities. They are under constant pressure to provide faster and safer facilities with economy and a minimum of social dislocation. They have attacked these problems with vigor and a measure of success to which the growing systems of freeways and public transport attest. The study explores the potentialities of 'maximized' use of bus transit in the 'middle sized' urgan areas, those which range in size from about 200,000 to 1,000,000 persons. In general, urban communities with less than a million residents have not been able to provide sufficient patronage to support a conventional system of rapid mass transport (rail vehicles on exclusive rights-of-way), yet the overall generation of travel (particularly at the upper end of the range) requires an extensive and elaborate system of high-capacity expressways and arterials to achieve an optimum level of service when all travel is performed by car.
PB-173 665 HC$3.00 MF$0.65

EVALUATION OF BUS TRANSIT DEMAND IN MIDDLE-SIZED URBAN AREAS, VOLUME II: APPENDIX.
Final rept. on Phase 1.
Smith (Wilbur) and Associates, New Haven, Conn.
1966, 187p
Contract CPR-11-1849
See also PB-173 665.

Descriptors: (*Passenger vehicles, Urban areas), (*Urban areas, Transportation), Population, Statistical analysis, Traffic, Employment, Mobility, Economics.

Confents of Appendix: General magnitudes of travel in urbanized areas; Car ownership and other population statistics; Trip generation related to family size, cars owned, number of workers, and household income; Residential accessibility to bus transit service; Choice and captive bus trips: Four urbanized areas; Evaluation of alternative modes to CBD; 'Portal-to-portal' travel times, by mode.
PB-173 666 HC$3.00 MF$0.65

WASHINGTON AREA MOTOR VEHICLE ACCIDENT COST STUDY (WAMVACS).
Smith (Wilbur) and Associates, New Haven, Conn.
For primary bibliographic entry see Field 13L.
PB-173 859 HC$3.00 MF$0.65

REDUCED VISIBILITY (FOG) STUDY.
California State Div. of Highways, Sacramento. Traffic Dept.
For primary bibliographic entry see Field 13L.
PB-174 722 HC$3.00 MF$0.65

PROCEEDINGS: PROGRAM REVIEW MEETING: RESEARCH AND DEVELOPMENT OF TRAFFIC SYSTEMS, DECEMBER 6, 7, AND 8, 1966, GAITHERSBURG, MD.
Bureau of Public Roads, Washington, D. C.
For primary bibliographic entry see Field 13B.
PB-174 746 HC$3.00 MF$0.65

AUTOMOTIVE MAINTENANCE EQUIPMENT IN THAILAND.
Business Resenrch Ltd., Bangkok (Thailand).
For primary bibliographic entry see Field 5C.
PB-174 785 HC$3.00 MF$0.65

EFFECTIVENESS OF THREE VISUAL CUES IN THE DETECTION OF RATE OF CLOSURE AT NIGHT,
BioTechnology, Inc., Arlington, Va.
James F. Parket, Jr., Robert R. Gilbert, and Richard F. Dillon. Mar 64, 51p BTI-64-1
Contract CPR-11-8683
Prepared in cooperation with Bureau of Public Roads, Washington, D. C.

Descriptors: (*Vehicles, Night vision), (*Visual acuity, Traffic), Visibility, Passenger vehicles, Vehicle accessories, Light, Brightness, Velocity, Human engineering, Traffic.

This study was concerned with an evaluation of the visual cues used by a driver at night as he decides he is overtaking the vehicle in front of him. Three cues were selected for study. These were: (1) Change in apparent area (size) of taillight surfaces. (2) Change in apparent brightness of taillight surfaces. (3) Change in visual angle subtended by taillights. The following conclusions are drawn from the data of this study: (1) The control condition, in which normal taillights were used, is significantly superior to the operation of any single cue. (2) The visual angle cue and the brightness cue each are superior to the area cue. (3) Level of visual angle and level of brightness were found to be significant. Level of area was not. (4) Approach speed does not influence the effectiveness of any of the cue conditions or of the control conditions. (5) Sensitivity to change in the visual angle cue appears to conform to the Weber psychophysical function.
PB-174 794 HC$3.00 MF$0.65

13G. HYDRAULIC AND PNEUMATIC EQUIPMENT

PRESSURE, BERNOULLI SUM, AND MOMENTUM AND ENERGY RELATIONS IN A LAMINAR ZONE OF SEPARATION.
Revised ed.,
Iowa Univ Iowa City Inst of Hydraulic Research
Enzo O. Macagno, and Tin-Kan Hung. 23 Aug 66, 28p
AROD-2981:6
Grant DA-ARO (D)-31-124-G31
Revision of manuscript submitted 23 Apr 66.
Availability: Published in The Physics of Fluids v10 n1 p78-82 Jan 1967.

Descriptors: (*Statistical distributions, *Laminar flow), (*Hydraulic fluids, Momentum), Separation, Shear stresses, Reynolds number, Navier-Stokes equations, Vortices, Two-dimensional flow, Integration.

The pressure field, the Bernoulli-sum variation, and the different terms of the impulse-momentum and work-energy relations have been determined computationally for a conduit expansion of 2:1 and a Reynolds number of 48 in the narrow part of the conduit. The procedure used was the integration of an explicit discretized form of the Navier-Stokes equations. The calculations were carried out with an IBM 7044 electronic computer. It was found that some terms of the differential and integrated forms of the basic equations were relatively small. The integrated form of the work-energy relation can be simplified to only three of its terms. The role of the eddy was found to be essentially that of shaping the main flow, the exchange of momentum and energy with the main flow being rather small.
AD-653 219 Not available from CFSTI.

RESEARCH ON A NON-DESTRUCTIVE FLUIDIC STORAGE CONTROL DEVICE.
Giannini Controls Corp., Malvern, Pa.
S. K. Ho, and T. D. Reader. Jun 67, 92p NASA-CR-783
Contract NAS12-43

Descriptors: *Display system, *Fluidics, *Memory storage unit, Alpha, Association, Bead, Cavity, Device, Display, Electronics, Glass, Hour, Liquid, Memory, Number, Storage, System, Unit.

For abstract, see STAR 05 14.
N67-27269 HC$3.00 MF$0.65

DEVELOPMENT OF A PNEUMATIC DYNAVECTOR ROTARY SERVOMOTOR FINAL TECHNICAL REPORT.
Bendix Corp., Southfield, Mich. Research Labs. Div.
15 Jan 67, 62p NASA-CR-84463, TR-3747
Contract NAS8-5407

Descriptors: *Actuator, *Gimbal, *Pneumatic equipment, *Rotary drive, *Servomotor, Design, Drive, Equipment, Fluid, High speed, Pneumatic, Power, Rotary, Torque, Virtual.

For abstract, see STAR 05 14.
N67-27502 HC$3.00 MF$0.65

13H. INDUSTRIAL PROCESSES

INVESTIGATION OF CALOTTAN SHEET STIFFENING PROCESS,
Army Engineer Research and Development Labs., Fort Belvoir, Va.
George D. Farmer, and William B. Spangler. 24 Oct 62, 66p AERDL-1727-TR

Descriptors: (*Metal plates, *Cold working), Sheets, Bending, Patents, Structural parts, Aluminum alloys, Steel, Hardness, Mechanical properties, Honeycomb cores, Impact shock, Shock resistance, Processing.

The investigation revealed that metallic sheet materials when cold formed in the CALOTTAN stiffening pattern show increased rigidity and impact resistance worth considering in equipment design. However, this pattern like all stiffening patterns known to the authors displays preferred axes of rigidity. The investigation also showed that rig-

idized metallic sheet available in the United States from X Company is approximately as efficient as calottized sheet. The rigidity and impact resistance of sheet materials are increased considerably by calottizing. The rigidity of sheet materials is increased ten times by calottizing is considered valid for only the thinnest sheet of the range that can be formed in the CALOTTAN die.
AD-296 519 HC$3.00

A STUDY ON ELECTRODEPOSITION OF ORGANIC COATINGS FOR POSSIBLE MILITARY USAGE.
Coating and Chemical Lab., Aberdeen Proving Ground, Md.
For primary bibliographic entry see Field 11C.
AD-641 314 HC$2.00 MF$0.50

PRODUCTION ENGINEERING MEASURE FOR TYPE CR- (XM-57)/U CRYSTAL UNITS.
Bulova Watch Co., Inc., Woodside, N. Y. Electronics Div.
For primary bibliographic entry see Field 9A.
AD-642 809 HC$3.00 MF$0.65

LOW COST INTEGRATED CIRCUIT TECHNIQUES.
Philco-Ford Corp Lansdale Pa Microelectronics Div
For primary bibliographic entry see Field 9E.
AD-652 699 HC$3.00 MF$0.65

AN INVESTIGATION OF INDUSTRIAL PRACTICES IN JOINING FOILS WITH EXPERIMENTAL INVESTIGATION IN PRESSURE WELDING FOIL ALUMINUM.
Master's thesis,
Texas Univ Austin Defense Research Lab
Jack Durward Trawick. Jan 61, 55p Rept no. DRL-458
Contract NOrd-16498
Prepared in cooperation with Johns Hopkins Univ., Silver Spring, Md. Applied Physics Lab., CF-2908.

Descriptors: (*Foils, *Welding), Theses, Aluminum, Pressure welding, Joining, Thickness.

The report contains the results of a two-fold investigation on thin foil welding technology. Foil is used to denote metal sheet of 0.01-in. thickness and under. The purpose of the first part of this investigation is to review the research and development that has been performed by industry and various investigators in adapting welding techniques to the special requirements of foil gage welding. Welding techniques that have received the greatest attention and consequent development by investigators are the inert-gas-shielded arc welding process, the resistance welding process, and the relatively new ultrasonic welding process. Techniques, applications, and limitations of each of the processes are noted. To supplement the small amount of information available regarding the pressure welding of foils, the second part of this report is devoted to experimentation in cold and hot pressure welding of commercially pure aluminum foil of 0.0025-in. thickness. An analysis of test results is made to determine the interrelationship of pressure, time, and temperature for optimum welding conditions. (Author)
AD-652 799 HC$3.00 MF$0.65

ELECTROMAGNETIC INSPECTION OF HARDENED STEEL.
Frankford Arsenal Philadelphia Pa Fire Control Development and Engineering Labs
For primary bibliographic entry see Field 11F.
AD-653 007 HC$3.00 MF$0.65

FATIGUE OF STRUCTURAL ELEMENTS. STUDY OF RESIDUAL STRESSES IN LINEARLY VARYING BIAXIAL STRESS FIELDS.
Naval Applied Science Lab Brooklyn N Y
For primary bibliographic entry see Field 20K.
AD-653 068 HC$3.00 MF$0.65

METHODS FOR MINIMIZING THE EMBRITTLING EFFECT OF HYDROGEN IN ELECTROPLATED HIGH STRENGTH ALLOY STEEL ITEMS.
Frankford Arsenal Philadelphia Pa
For primary bibliographic entry see Field 11F.
AD-653 156 HC$3.00 MF$0.65

INVESTIGATION OF THE NATURE OF STRUCTURAL DAMAGE IN METAL-FORMING PROCESSES.
Final rept., Jan 66-Apr 67,
General Electric Co Schenectady N Y Research and Development Center
H. C. Rogers, and L. F. Coffin, Jr. Jun 67, 79p
Contract NOw-66-0546

Descriptors: (*Drawing (Machine processing), *Hydrostatic pressure), Aluminum alloys, Brass, Density, Friction, Fracture (Mechanics), Lubrication, Tensile properties, Damage, Deformation, Stresses, Microstructure.

The present investigation is the third phase of a broad program undertaken with the goal of understanding the nature of structural damage during metal-forming processes and, in particular, the role of the hydrostatic component of the stress during deformation on the generation of such damage. Sheet drawing experiments were performed on 6061-T6 aluminum alloy, 60-40 unleaded brass, and Ferrovac E under a variety of experimental conditions. The ability to assess the resulting damage in terms of changes in the density of the metals after drawing has been improved over that of previous studies by modifications in the density measuring facility. Among the improvements has been the adoption of diethyl phthalate as the immersion fluid replacing water and the development of a complete analytical expression for the density using the three-weighing techniques which factors in minor changes in temperature and air buoyancy. The results of drawing experiments on the aluminum alloy indicate that conditions producing the same state of hydrostatic stress at the midplane of the strip generate nearly comparable damage. There is a minor effect of die angle. The density of that portion of the strips near the midplane, where the stress state is most highly tensile, is substantially lower than the average strip density.
AD-633 361 HC$3.00 MF$0.65

CERAMIC SYSTEMS FOR MISSILE STRUCTURAL APPLICATIONS.
Georgia Inst. of Tech., Atlanta. Engineering Experiment Station.
For primary bibliographic entry see Field 11B.
AD-811 146 HC$3.00 MF$0.65

STUDY ON DEVELOPMENT OF SATURN MANUFACTURING TECHNOLOGY FOR WELDING METHODS AND TECHNIQUES TO REDUCE HYDROGEN POROSITY FINAL REPORT, 25 FEB. - 24 SEP. 1966.
Southern Research Inst., Birmingham, Ala. Metallurgy Div.
A. C. Willhelm. 28 Oct 66, 57p NASA-CR-84156, REPT.-8086-1806-VII
Contract NAS8-20307

Descriptors: *Aluminum alloy, *Arc welding, *Porosity, Calcium, Cesium, Gas, Getter, Hydrogen, Metal, Plate, Rare, Saturn project, Titanium, Zirconium.

For abstract, see STAR 05 14.
N67-26508 HC$3.00 MF$0.65

NEW COATING PROCESS FOR FOAMED POLYETHYLENE INSULATED TELEPHONE CABLE.
Sumitoto Electric Industries, Ltd., Yokohama (Japan).
For primary bibliographic entry see Field 17B.
For abstract, see STAR 05 14.
N67-26784 HC$3.00 MF$0.65

STRETCH FORMING OF VERY LONG STAINLESS STEEL SKINS.
Hawker Siddeley Aviation, Ltd., London (England).
J. Fray, and W. Padley. Feb 67, 21p S+T-MEMO-1/67
Contract KS/1/0135/CB.43/A//2/

Descriptors: *Heat treatment, *Precipitation hardening, *Stainless steel, *Stretch forming, Alloy, Aluminum, Carbon, Chromium, Cold, Copper, Distortion, Forming, Handling, Hardening, Heat, Long, Low temperature, Machine, Manganese, Molybdenum, Nickel, Precipitation, Rolling, Silicon, Skin, Stainless, Steel, Stretch, Titanium, Transformation, Treatment.

For abstract, see STAR 05 14.
N67-27257 HC$3.00 MF$0.65

IMPORTANCE IN LUBRICATION OF VARIOUS INTERFACE TYPES FORMED DURING VACUUM DEPOSITION OF THIN METALLIC FILMS.
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
D. H. Buckley, and T. Spalvins. 1967, 18p
NASA-TM-X-52305
Presented At the 10th Vacuum Metal. Conf., New York, 13-15 Jun. 1967

Descriptors: *Gold, *Lubrication, *Metal film, *Surface coating, *Thin film, *Vacuum deposition, Adhesion, Coating, Deposition, Diffusion, Durability, Film, Friction, High energy, Interface, Ion, Metal, Plating, Soft, Strength, Substrate, Surface, Thin, Vacuum, Vapor.

For abstract, see STAR 05 14.
N67-27319 HC$3.00 MF$0.65

IDENTIFYING OPTIMUM PARAMETERS OF HOT EXTRUSIONS.
Boeing Co., Seattle, Wash. Nuclear Metals, Inc., West Concord, Mass. Space Div.
J. G. Hunt, and R. W. Rice. May 67, 209p
NASA-CR-84412, IR-3
Contract NAS7-276
Prepared Jointly Nucl. Metals, Inc.

Descriptors: *Extrusion, *Hot forming, *Magnesium oxide, Ceramic, Effect, Hot extrusion, Magnesium, Mechanical, Oxide, Property, Shape, Technique.

For abstract, see STAR 05 14.
N67-27371 HC$3.00 MF$0.65

NONDESTRUCTIVE TESTING FOR SPACE APPLICATION, FEASIBILITY AND PRELIMINARY DESIGN STUDY PHASE I REPORT, JULY-SEPTEMBER 1966.
Hamilton Standard Div., United Aircraft Corp., Windsor Locks, Conn.
W. A. Zoran. 15 Oct 66. 132p NASA-CR-84442
Contract NAS8-20630

Descriptors: *Nondestructive testing, *Space environment, Application, Current, Design, Eddy, Environment, Feasibility, Nondestructive, Radiography, Space, Testing, Ultrasonic.

For abstract, see STAR 05 14.
N67-27429 HC$3.00 MF$0.65

EVALUATION OF MACHINE SEWN JOINTS FOR THE FLEXIBLE HEAT SHIELD CURTAIN.
Boeing Co., Seattle, Wash. Launch Systems Branch.
J. N. Dexter. 30 Dec 66. 10p NASA-CR-84474, T5-6556-10
Contract NAS8-5608

Descriptors: *Asbestos, *Fabric, *Heat shield, *Reinforced material, *Silicon oxide, Cloth, Curtain, Feasibility, Flame, Joint, Machine, Material, Oxide, Ply, Reinforced, Sewing, Silicon, Wire.

For abstract, see STAR 05 14.
N67-27508 HC$3.00 MF$0.65

INVESTIGATION OF X-RAY INDICATIONS IN GOX LINE WELD.
Boeing Co., Seattle, Wash. Launch Systems Branch.
R. R. Sands. 1966, 12p NASA-CR-84497, T5-6539-78
Contract NAS8-5608

Descriptors: *Pipeline, *Welded joint, *X-ray analysis, Analysis, Effect, Gaseous, Heating, Incipient, Inconel, Joint, Line, Longitudinal, Melting, Oxygen, Property, Tube, X-ray.

For abstract, see STAR 05 14.
N67-27650 HC$3.00 MF$0.65

RESEARCH ACHIEVEMENTS REVIEW, VOLUME II. REPORT NO. 5 - QUALITY AND RELIABILITY ASSURANCE RESEARCH AT MSFC.
National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala. 1966, 36p NASA-TM-X-53602

Descriptors: *Infrared inspection, *Nondestructive testing, *Slurry, *Ultrasonic testing, Adhesive, Composite, Detection, Detector, Flaw, Hydrostatics, Microelectronics, Microscope, Propellant, Strength, Structure, Tank.

For abstract, see STAR 05 14.
N67-27751 HC$3.00 MF$0.65

TESTING AND EVALUATION OF THE PARAMOUNT GRINDING MILL.
Utah Sprocket and Machinery Co., Inc., Salt Lake City.
For primary bibliographic entry see Field 13I.
PB-174 744 HC$3.00 MF$0.65

METAL CUTTING MACHINES IN MALAYA.
Far East Research Organisation Ltd., Singapore.
For primary bibliographic entry see Field 5C.
PB-174 780 HC$3.00 MF$0.65

13I. MACHINERY AND TOOLS

BALANCING CRITERIA AND THEIR RELATIONSHIP TO CURRENT AMERICAN PRACTICE.
Technical rept.,
Houston Univ Tex Dept of Mechanical Engineering
D. Muster, and B. Flores. Mar 67, 69p Rept no. TR-3
Contract NObs-88657

Descriptors: (*Mechanical engineering, *Stability), (*Vibration, Tolerances (Mechanics)), Machines, Statistical analysis, Bearings, Rotation, Graphics, Engines + motors, Turbines.

The results of a survey on acceptable residual specific unbalance are discussed in the context of existing balancing criteria. The study includes a statistical analysis of the data received. The results are divided in two subclasses of information according to rotor-use and rotor-weight for the purpose of grouping quantitative data for similar rotors. (Author)
AD-652 831 HC$3.00 MF$0.65

A NUMERICAL SOLUTION OF THE ELASTO-HYDRODYNAMIC FILM THICKNESS IN AN ELLIPTICAL CONTACT.
Mechanical Technology Inc Latham N Y
For primary bibliographic entry see Field 11H.
AD-652 923 HC$3.00 MF$0.65

CALCULATION OF ELASTOHYDRODYNAMIC FILM THICKNESS IN HIGH SPEED ROLLING AND SLIDING CONTACTS.
Mechanical Technology Inc Latham N Y
For primary bibliographic entry see Field 11H.
AD-652 924 HC$3.00 MF$0.65

CONCERNING THE STABILITY OF A FLEXIBLE SHAFT WITH ONE DISK WHEN ACTED UPON BY THE FORCES OF INTERNAL AND EXTERNAL FRICTION AND BY THE WEIGHT OF THE DISK.
Technical rept.,
Houston Univ Tex Dept of Mechanical Engineering
A. Tondl. May 67, 17p Rept no. TR-4
TT-67-62066
Contract NObs-88657
Trans. of Akademiya Nauk SSSR, Otdelenie Tekhnicheskikh Nauk. Izvestiya, n1 p21-5 1958.

Descriptors: (*Flexible shafts, Stability), USSR, Disks, Vib ration, Friction, Internal friction, Dynamics, Damping, Force (Mechanics).

The stability of a flexible shaft with a disk in the middle acted upon by the forces of internal and external friction is studied. The regions and conditions for stable motion are identified for a simple model. (Author)
AD-652 934 HC$3.00 MF$0.65

AN ANALYSIS OF EXPERIMENTAL DATA ON ENTRANCE EFFECTS IN CIRCULAR THRUST BEARINGS.
Franklin Inst., Philadelphia, Pa. Research Labs.
S. P. Carfagno. Sep 66, 24p NASA-CR-80111, I-A2049-28
Contract NONR-2342/00/
Sponsored In Part By Nasa

Descriptors: *Flow velocity, *Load factor, *Thrust bearing, Bearing, Capacity, Circular, Computation, Effect, Empirical, Entrance, Equation, Factor, Flow, Load, Method, Pressure, Radius, Rate, Thrust, Velocity.

For abstract, see STAR 05 03.
N67-13011 HC$3.00 MF$0.65

THE DESIGN AND BUILD OF A GAS BEARING GYROSCOPE POSSESSING HIGH "G" AND STERILIZATION CAPABILITY AND UTILIZING A LOW POWER GAS BEARING SPINMOTOR AND HIGH FREQUENCY PUMP QUARTERLY PROGRESS REPORT, 3 JAN. - 31 MAR. 1967.
Honeywell, Inc., Minneapolis, Minn. Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena. Aerospace Div.
R. F. Anderson, G. J. Erickson, and D. M. Peterson. 31 Mar 67, 35p NASA-CR-84146, REPT.-20660-QR1
Contracts NAS7-100, JPL-951559
Prepared for Jpl

Descriptors: *Gas bearing, *Gyroscope, Bearing, Design, Gas, Motor, Power, Pump, Spin, Sterilization.

For abstract, see STAR 05 14.
N67-26518 HC$3.00 MF$0.65

BEARING TORQUE AND FATIGUE LIFE STUDIES WITH SEVERAL LUBRICANTS FOR USE IN THE RANGE 500 DEG F TO 700 DEG F.
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
E. N. Bamberger, R. J. Parker, and E. V. Zaretsky. May 67, 22p NASA-TN-D-3948
Contract 720-03-01-01-22

Descriptors: *Fatigue life, *High temperature lubricant, *Rolling contact bearing, *Torque measuring apparatus, Additive, Apparatus, Bearing, Characteristics, Contact, Ether, Fatigue, Fluorocarbon, High temperature, Life, Lubricant, Measuring, Mineral, Oil, Operation, Paraffin, Polyester, Polyphenyl, Rolling, Test, Torque.

For abstract, see STAR 05 14.
N67-26543 HC$3.00 MF$0.65

APPLICATION OF WELDED THIN METAL IN NEW COMMUNICATION CABLE DESIGNS.
Canada Wire and Cable Co., Ltd., Toronto (Ontario).
For primary bibliographic entry see Field 9A.
For abstract, see STAR 05 14.
N67-26788 HC$3.00 MF$0.65

METALLURGICAL ANALYSIS OF FILTER HOUSING ASSEMBLY 60 B83104-1, SERIAL NUMBER 6 DEG FAILURE.
Boeing Co., Seattle, Wash. Launch Systems Branch.
C. B. Schwartz. 12 Sep 66, 20p NASA-CR-84475, T5-6539-80
Contract NAS8-5608

Descriptors: *Aluminum alloy, *Crack propagation, *Filter, *Stress corrosion, Alloy, Aluminum, Assembly, Corrosion, Crack, Failure, Fracture, Heat, Housing, Leakage, Microstructure, Propagation, Stress, Treatment.

For abstract, see STAR 05 14.
N67-27509 HC$3.00 MF$0.65

METALLURGICAL ANALYSIS OF HANDLING TOOL FORWARD BOOSTER ASSEMBLY.
Boeing Co., Seattle, Wash. Launch Systems Branch.
R. R. Sands. 30 Nov 67, 8p NASA-CR-84476
Contract NAS8-5608

Descriptors: *Crack formation, *Decarburization, *Welded structure, Analysis, Crack, Eye, Formation, Handling, Hardening, Lifting, Metallography, Metallurgy, Spectrography, Steel, Structure, Tool, Welding.

For abstract, see STAR 05 14.
N67-27510 HC$3.00 MF$0.65

ON THE OPTIMAL STABILIZATION OF THE ROTATING MOTION OF A SOLID WITH A FIXED POINT BY MEANS OF FLYWHEELS.
International Information, Inc., Philadelphia, Pa.
For primary bibliographic entry see Field 20K.
For abstract, see STAR 05 14.
N67-27569 HC$3.00 MF$0.65

TESTING AND EVALUATION OF THE PARAMOUNT GRINDING MILL.
Final rept.,
Utah Sprocket and Machinery Co., Inc., Salt Lake City.
Frank R. Leonard. Jun 67, 38p
Contract C-202-66
Prepared in cooperation with Economic Development Administration, Washington, D. C.

Descriptors: (*Grinding, *Milling machines), Economics, Velocity, Ores (Nonmetallic), Energy, Portable, Sampling, Industries, Machine tools, Design, Vibration, Ores (Metal sources).

There is a need in the Western Mining Industry for an efficient, portable, inexpensive dry mill to assist in the reactivation of the multitude of marginal mining properties which are now closed. The objectives of the testing of the Paramount Grinding Mill were to find the grinding rates at various speeds and to determine the energy requirements for grinding. Further, the results of these tests are to be examined in order to determine whether or not this mill is of economic value. (Author)
PB-174 744 HC$3.00 MF$0.65

POST AUDITING MACHINE TOOL INVESTMENTS,
Union Carbide Corp., Oak Ridge, Tenn. Y-12 Plant.
J. L. Williams, and A. M. Christman. 31 Oct 66, 15p
Contract W-7405-eng-26

Descriptors: (*Machine tools, Cost effectiveness), (*Management engineering, Machine tools).

For abstract, see NSA 21 02.
Y-1557 HC$3.00 MF$0.65

AN INSPECTION DATA LOGGING SYSTEM (DLS),
Union Carbide Corp., Oak Ridge, Tenn. Y-12 Plant.
W. A. Groppe, and W. W. Lee. 5 Apr 67, 58p
Contract W-7405-eng-26

Descriptors: (*Positioning devices (Machinery), Meters), (*Alignment, Accuracy), Computer programs, Computer personnel, Machines, Digital computers, Errors, Reduction.

For abstract, see NSA 21 12.
Y-1565 HC$3.00 MF$0.65

13J. MARINE ENGINEERING

GENERAL CONCEPT FOR AN ELECTRIC MOTOR REPAIR PROGRAM FOR THE FLEET.
Technical memo.,
Navy Marine Engineering Lab Annapolis Md
R. E. Gustafson. Mar 67, 22p Rept no. MEL-TM-128/66

Descriptors: (*Electric motors, Maintenance), Submarines, Ships, Reliability, Electric motor noise, Shipborne, Operation, Failure (Electronics), Vibration, Tenders (Vessels).

A comprehensive program covering all aspects of the maintenance and repair of electric motors in the Fleet and at repair facilities, is urgently needed. Such a program is necessary for the development in the Fleet of the service life and reliability inherent in electric motors. Some of the shipboard motors, particularly some of the larger low-noise motors in submarine service, have experienced repeated failures and are a significant reliability problem. A program which includes design review, installation and maintenance guides, improved repair facilities, training for repair personnel, instructions and drawings, and guides for failure analysis can reduce the costs in time, funds, and lack of reliability associated with repeated unsatisfactory motor repairs. (Author)
AD-652 796 HC$3.00 MF$0.65

COMPARISONS OF EXPERIMENTALLY DETERMINED AND THEORETICALLY PREDICTED PRESSURES IN THE VICINITY OF A MARINE PROPELLER.
Research and development rept.,
Naval Ship Research and Development Center Washington D C Hydromechanics Lab
Stephen B. Denny. May 67, 57p
NSRDC-2349

Descriptors: (*Propellers (Marine), Pressure), Experimental data, Theory, Model tests, Hydrodynamics, Loading (Mechanics).

Pressures were measured on a flat plate placed near a model marine propeller in a 24-inch water tunnel. The blade-rate portions of the values measured in uniform flow are compared with field-point pressure predictions of theories for two propeller tip clearances and three advance conditions. Also shown are comparisons between theory and experiment of the separate contributions of propeller thickness and loading. Additional experimental results show the effect of blade number, blade area ratio, and blade skew on propeller-induced pressures. Flat-plate pressure measurements were also obtained near a propeller operating in nonuniform flow and at a cavitating condition in uniform flow. The two theories investigated, field-point pressure calculation methods by Kerwin and by Breslin, both gave good predictions of the magnitudes of the induced blade-rate pressures due to blade thickness. From the experiments it was found that a considerable reduction in induced blade-rate pressure results from increased blade area and extreme blade skew. Propeller blade cavitation increased the induced field pressures. Pressures induced by the propeller while it operated in nonuniform flow tended to be considerably larger than those induced during a corresponuing advance in uniform flow and particularly so at off-design advance conditions. (Author)
AD-652 809 HC$3.00 MF$0.65

AN INVESTIGATION OF THE PROBLEM OF MECHANIZATION AND WORKER SECURITY IN THE MARITIME INDUSTRY-LONGSHOREMEN ASPECT.
Temple Univ Philadelphia Pa
For primary bibliographic entry see Field 5I.
AD-652 977 HC$3.00 MF$0.65

APPLICATION OF THE LIFTING FOIL THEORY SOLVED BY RHEOELECTRIC ANALOGY TO THE CALCULATION AND DESIGN OF SUB- AND SUPER-CAVITATING PROPELLERS.
Final rept.
Bureau D'Analyse Et de Recherche Appliquees Boulogne-Billancourt (France)
Mar 67, 53p
Contract N62558-4998

Descriptors: (*Propellers (Marine), Design), Cavitation, Lift, Theory, Analog systems, Mathematical analysis, France.
Identifiers: Subcavitating propellers, Supercavitating propellers.

The first part of the report is devoted to the calculation of a conventional type propeller operating under sub-cavitating conditions, and to the results of experimental tank tests carried out on a model developed from the results of these calculations. The second part deals with the theory and calculation of a super-cavitating propeller designed for a cavitation tunnel test. (Author)
AD-652 981 HC$3.00 MF$0.65

THE INFLUENCE OF A FIRE-RETARDANT UNDERCOAT ON THE BURNING CHARACTERISTICS OF A COMBUSTIBLE TOPCOAT.
Naval Research Lab Washington D C
For primary bibliographic entry see Field 11C.
AD-653 062 HC$3.00 MF$0.65

CONCEPTUAL STUDY OF A MANNED UNDERWATER STATION.
Final rept.,
General Dynamics Corp Groton Conn Electric Boat Div
Lawrence Kurt. Apr 67, 254p Rept no. N62399-67-C-0004
NCEL-CR-67.019
Contract Y-F015-01-01-003

Descriptors: (*Manned, *Underwater navigation), Underwater equipment, Life support, Underwater-to-surface, Sea water, Oceans, Buoyancy, Velocity, Anchors (Marine), Physical properties, Auxiliary power plants, Salinity, Design, Frequency, Time, Deep submergence, Transmission lines, Density, Theory, Tables.

The report covers the conceptual development of a Manned Underwater Station, capable of operating in depths down to 6000 feet, providing adequate life support facilities for 5 men for periods of up to 30 days. The placement of the station uses the concept of free descent without the use of power by using negative buoyancy as the motivating force. Bottom approach is accomplished by winching against an anchor weight which initially provided a portion of the negative buoyancy. The station itself is designed to be positively buoyant at all times. Ascent is accomplished by release of anchor weight and using the positive buoyancy of the station to freely ascend. The report further studies power plants suitable for the station load of 22 KWe and recommends three types of sources, one surface oriented, the remaining in situ that could be applied to the station. The report also outlines potential missions that could be applied to the station. (Author)
AD-653 075 HC$3.00 MF$0.65

RATIONAL STRUCTURE OF FORMULAS FOR CALCULATING THE STATISTICAL CHARACTERISTICS OF WAVE LOADS,
Naval Ship Systems Command Washington D C
V. V. Kozlyakov. May 67, 16p Rept no. NAVSHIPS-Trans-1042
TT-67-62069
O Ratsionalnoi Strukture Formul dlya Opredeleniya Statisticheskikh Kharakteristik Volnovykh Nagruzok, trans. of Sudostroenie (USSR) n8 p10-6 1966.

Descriptors: (*Ocean waves, *Loading (Mechanics)), (*Stresses, Ship structural components), Ship hulls, Transfer functions, Models (Simulations), Shipping (Marine), Mathematical analysis, Statistical functions, Transports.

This article gives general equations and curves for the statistical characteristics of wave loads acting on a ship's hull, for actual two and three dimensional irregular waves.
AD-653 082 HC$3.00 MF$0.65

CONCEPT DESIGN FOR A MANNED UNDERWATER STATION.
Westinghouse Electric Corp Baltimore Md Westinghouse Deep Submergence Systems
Mar 67, 234p
NCEL-CR-67.017
Contract N62339-67-C-0003

Descriptors: (*Underwater vehicles, Design), Human engineering, Hulls (Marine), Heating, Power supplies, Cooling, Food, Sanitary engineering, Life support, Safety, Scientific research, Closed ecological systems, Armed forces operations, Costs, Confined environments, Naval vessels (Support), Manned, Deep submergence, Sea rescue equipment, Underwater equipment.
Identifiers: Manned Underwater Station.

The results of a fifteen man-month conceptual design study for a Manned Underwater Station are presented, conforming to the requirement of a 30-day mission for 5 men at 6000 feet. The station is self-supporting when emplaced by using an isotope heat source with turbo-electric power generation, and a life support system to provide comfortable one-atmosphere environment. The pressure

hull is toroidal in shape, forty feet in overall diameter with a 10-foot tube diameter. HY-140 steel is recommended for construction of the internally ring-stiffened hull. The concept provides a stable platform with maximum viewing of the bottom in the limited visibility in the deep ocean. For bottom locations with sufficient bearing strength, the hemispherical foundation and toroidal hull act as a ball-and socket joint with unique leveling capability. Where extremely low bearing strength materials are encountered, modifications are made to distribute the load on the bottom. Additional toroidal modules, mating in a vertical stack, permit expanding the station for larger operational missions. Emergency power and life support provisions are included for a 5-day period beyond the 30-day mission requirement. However, with the recommended power system and the electro-mechanical life support equipment there is no reason why the mission time cannot be extended to 90 days when personnel interchange is undertaken. Crews may be exchanged by using small submersibles which have a mating capability with bottomed submarines. (Author)
AD-653 094 HC$3.00 MF$0.65

EVALUATION OF 25 FT. 8 IN. MOTOR CARGO BOAT (PLASTIC).
Test rept.,
Coast Guard Baltimore Md Field Testing and Development Center
C. Cuthrell. 26 May 67, 56p Rept no. 458

Descriptors: (*Plastic boats, Tests), Performance (Engineering), Cargo ships, Standardization, Maneuverability.
Identifiers: Evaluation.

The project was established to carry out a one-year operational evaluation of four prototype motor cargo boats (plastic) under normally assigned operating conditions and requirements. The desired result of this supervised operational evaluation is information to assist in the decision making concerning the production of this type boat. Phase I of the project covers extensive familiarization and testing of the first of the four prototype boats. The report covers only Phase I testing and standardization trials and tests. A photographic record of most of the tests was maintained and is included. (Author)
AD-653 284 HC$3.00 MF$0.65

A SUMMARY OF SUBMARINE STRUCTURAL RESEARCH. PART I. CONVENTIONAL HULL CONFIGURATIONS, CHAPTER IX - HULL PENETRATIONS.
Research and development rept.,
David Taylor Model Basin Washington D C Structural Mechanics Lab
Oles Lomacky. May 67, 121p
NSRDC-2309
See also AD-645 068.

Descriptors: (*Submarine hulls, Stresses), Configuration, Penetration, Cylindrical bodies, Structural shells, Spheres, Metal plates, Elasticity, State-of-the-art reviews.

The state of knowledge in the static elastic stress analysis of the cylindrical and spherical shell penetrations is summarized. Curves, tables, and formulas are presented for the stress concentration factors. In addition, experimental data and research needs are discussed. (Author)
AD-653 289 HC$3.00 MF$0.65

UNDERSEA VEHICLES FOR OCEANOGRAPHY.
Interagency Committee on Oceanography Washington D C
Oct 65, 89p Rept no. ICO Pamphlet-18
Availability: Hard copy available from Superintendent of Documents, GPO, Wahsington, D. C., 20402, $0.65.

Descriptors: (*Oceanographic vessels, Underwater), Design, Scientific research, Oceanology, Manned, Reviews.

The scope of the report is generally limited to a consideration of the capabilities and design characteristics of underseas vehicles for scientific exploration. It is concerned only with manned, powered, dry submersibles.
AD-653 291 MF$0.65

BOATING ACCESSORIES AND EQUIPMENT IN ITALY.
Gennaro (Pietro) e Associati, Milan (Italy).
For primary bibliographic entry see Field 5C.
PB-174 783 HC$3.00 MF$0.65

BOATING ACCESSORIES IN THE UNITED KINGDOM.
Comart Research Ltd., London (England).
For primary bibliographic entry see Field 5C.
PB-174 784 HC$3.00 MF$0.65

13L. SAFETY ENGINEERING

ARMY ACCIDENT REPORTING. RESULTS OF SOME EXPLORATORY INTERVIEWS.
Interim rept.,
George Washington Univ., Alexandria, Va. Human Resources Research Office.
Berton Winograd. Sep 54, 40p

Descriptors: (*Motor vehicle accidents, Army personnel), Sampling, Reports, Safety, Attitudes, Group dynamics, Errors, Social communication, Research program administration, Human engineering, Questionnaires.

The interviews with safety directors revealed some of their attitudes and opinions about accident reporting. The main findings are: (1) Reporting completeness, quality and intensiveness depend on the seriousness of the accident and on the type of installation at which it is reported. In general, serious accidents are reported more completely than trivial accidents. The reporting systems of installations with a preponderance of civilian personnel produce more record-keeping and more intensive reporting than posts with a preponderance military. (2) The usefulness of reports is adversely affected by motivations of supervisors that are contrary to the interests of accurate reporting. These motivations include the supervisor's desire to protect his men from punishment and to protect his safety record from any blemish. (3) Safety directors are under indirect pressures from military commanders to under-enumerate accidents. (Author)
AD-488 404 HC$3.00 MF$0.65

LIST OF LIBRARY ACCESSIONS.
Federal Fire Council Washington D C
9 Mar 67, 9p
See also AD-652 400.

Descriptors: (*Fire safety, Bibliographies), Reports.

The list indicates the latest publications received in the Federal Fire Council's fire safety reference library.
AD-652 866 HC$3.00 MF$0.65

DESIGN STUDY REPORT. EXPERIMENTAL EVALUATION OF PWI/CAS INTERROGATOR-TRANSPONDER TECHNIQUES. VOLUME I,
Sperry Gyroscope Co Great Neck N Y
For primary bibliographic entry see Field 1B.
AD-652 943 HC$3.00 MF$0.65

DESIGN STUDY REPORT. EXPERIMENTAL EVALUATION OF PWI/CAS INTERROGATOR-TRANSPONDER TECHNIQUES. VOLUME II,
Sperry Gyroscope Co Great Neck N Y
For primary bibliographic entry see Field 1B.
AD-652 944 HC$3.00 MF$0.65

THE INFLUENCE OF A FIRE-RETARDANT UNDERCOAT ON THE BURNING CHARACTERISTICS OF A COMBUSTIBLE TOPCOAT.
Naval Research Lab Washington D C
For primary bibliographic entry see Field 11C.
AD-653 062 HC$3.00 MF$0.65

AN OPERATIONAL CONCEPT OF AN EMERGENCY MEDICAL COMMAND AND COMMUNICATIONS SYSTEM.
Serendipity Associates Los Altos Calif
For primary bibliographic entry see Field 15C.
AD-653 105 HC$3.00 MF$0.65

FIRE PROTECTION FOR OXYGEN ENRICHED ATMOSPHERE APPLICATIONS,
Air Force Aero Propulsion Lab Wright-Patterson AFB Ohio
B. P. Botteri. 23 May 67, 26p Rept no. AFAPL-Conf-67-10
Prepared for presentation at the Fire Hazards and Extinguishment Conference, Aerospace Medical Division (AFSC), Brooks Air Force Base, Texas, 23 May 1967.

Descriptors: (*Fire safety, Closed ecological systems), Space simulation chambers, Oxygen, Life support, Protection, Effectiveness, Combustion, Ignition, Pressure, Hazards, Spark ignition, Helium group gases, Fire alarm systems, Fire extinguishers, Flammability, Spacecraft cabins.

Effective fire protection is achievable in oxygen enriched atmospheres. Specific requirements toward the realization of this goal include: (1) Elimination of ignition sources; (2) Minimization of combustibles with the complete exclusion of flammable liquids and gases; (3) If combustible materials must be employed, the type, quantity and arrangement in the chambers must be carefully controlled; (4) Fire walls and other containment techniques should be utilized to isolate potential high risk fire zones; (5) A fixed fire extinguishing system should be utilized which incorporates automatic initiation by flame and smoke detectors as well as manual initiation and provides rapid (<2 seconds) and sufficient agent discharge. (Author)
AD-653 113 HC$3.00 MF$0.65

AIR HANDLING SYSTEMS AND FIRE PROTECTION.
Federal Fire Council Washington D C
15 Dec 66, 45p

Descriptors: (*Fire safety, Symposia), (*Ventilation, Fire safety), Smokes, Combustion, Buildings, Exhaust gases, Hazards, Costs, Ventilation ducts, Damping, Design.

The Federal Fire Council Committee on Design Standards recognized the need for new ideas, different concepts and better dialogue on the problems existing in the air handling field. The result is this round table type conference so that participants from the audience may enter their thoughts. The panel members were carefully selected to represent the several disciplines involved with air handling systems. This conference considered the field of air handling with the primary thought toward life safety and secondary purpose as the preservation of property. Participants were asked to avoid specific problem questions and to enter the discussions without reference to existing codes. (Author)
AD-653 295 HC$3.00 MF$0.65

TRANSPORTATION EFFECTS IN EMERGENCIES,
Foster Associates, Inc., Washington, D. C.
For primary bibliographic entry see Field 15E.
PB-173 600 HC$3.00 MF$0.65

WASHINGTON AREA MOTOR VEHICLE ACCIDENT COST STUDY (WAMVACS).
Smith (Wilbur) and Associates, New Haven, Conn.
1966, 303p
Prepared in cooperation with Bureau of Public Roads, Washington, D. C.

Descriptors: (*Motor vehicle accidents, *District of Columbia), (*Costs, Motor vehicle accidents), Economics, Environment, Roads, Motor vehicle operators.
Identifiers: Washington Metropolitan area.

The main objective of the study was to determine the direct costs of motor vehicle accidents and incidents in which vehicles registered in the Washington Metropolitan Area were involved in the 12 months between April 1, 1964, and March 31, 1965. The study also included detailed analyses of the numbers of involvements and direct costs of reported accidents as related to highway, vehicle, driver, and general environmental factors. The Washington Metropolitan Area (the study area) covers almost 1,500 square miles and had a 1960 population of about two million. Abouth 771,000 vehicles covered by this study were registered in this area as of June 30, 1964. These vehicles traveled almost seven billion vehicle-miles during the year on about 6,800 miles of streets and highways. The main sources of data for the study were the official police records for reported traffic accidents and incidents in each jurisdiction. Interviews were conducted with a carefully selected sample of vehicle owners recorded as having been involved in an accident or incident during the study period. The approximate numbers and costs of unreported accidents and incidents involving study area vehicles also were determined by contacting a separate sample of the owners of all vehicles registered in the area. The basic unit of analysis was the vehicle involvement rather than the accident or incident. Consistent with generally accepted theory, the principle was applied in this study that the cost of motor vehicle accidents may be correctly represented by the money value of damages and losser to persons and property, plus expenditures in connection with the accident potential.
PB-173 859 HC$3.00 MF$0.65

REDUCED VISIBILITY (FOG) STUDY.
California State Div. of Highways, Sacramento. Traffic Dept.
Mar 67, 143p STS-738
Prepared in cooperation with Bureau of Public Roads, Washington, D. C. Availability: Original document in color until exhausted.

Descriptors: (*Roads, *Safety), (*Fog, Visibility), (*Motor vehicle accidents, Fog), Visual signals, Police, Safety devices, Velocity, Sound signals, Meteorological phenomena.

This study was initiated by a request from the State Senate to determine possible means of reducing multi-vehicle accidents in periods of fog. Less than two percent of all accidents occurring on rural State highways and urban freeways are multiple vehicle fog accidents; however, those that do occur are quite spectacular with large amounts on news coverage. The methods of attack on fog accidents can be classified into four general categories: 1. Roadway and Signing 2. Patrol Activity 3. Public Information 4. Vehicle and Equipment. Of all the devices and techniques tried on the highway, only the posting of speed limits had any measurable effect on traffic. This effect was limited and occurred primarily when traffic volumes were under 1,000 vehicles per hour per lane. The effect was more pronounced on expressways than on freeways. Research on vehicle rear-end lighting, initiated by this study, is continuing. (Author)
PB-174 722 HC$3.00 MF$0.65

13M. STRUCTURAL ENGINEERING

INVESTIGATION OF CALOTTAN SHEET STIFFENING PROCESS,
Army Engineer Research and Development Labs., Fort Belvoir, Va.
For primary bibliographic entry see Field 13H.
AD-296 519 HC$3.00

CUT-AND-COVER TRENCHING IN SNOW.
Snow Ice and Permafrost Research Establishment Wilmette Ill
For primary bibliographic entry see Field 8L.
AD-652 713 HC$3.00 MF$0.65

BASES AND FOUNDATIONS.
National Research Council of Canada Ottawa (Ontario) Div of Building Research
For primary bibliographic entry see Field 8L.
AD-652 773 HC$3.00 MF$0.65

USE OF ICE, SNOW AND FROZEN SOIL IN ENGINEERING STRUCTURES.
National Research Council of Canada Ottawa (Ontario) Div of Building Research
For primary bibliographic entry see Field 8L.
AD-652 774 HC$3.00 MF$0.65

NEW AND IMMEDIATE PROBLEMS IN ENGINEERING GEOCRYOLOGY.
National Research Council of Canada Ottawa (Ontario)
For primary bibliographic entry see Field 8L.
AD-652 775 HC$3.00 MF$0.65

APPLICATION OF THE MODIFIED REISSNER VARIATIONAL PRINCIPLE TO A CANTILEVER PLATE PROBLEM USING THE TECHNIQUES OF NUMERICAL INTEGRATION AND FINITE DIFFERENCES.
Master's thesis,
Texas Univ Austin Defense Research Lab
Dwight Alton Caughfield. Jan 61, 58p Rept no. DRL-457
Contract NOrd-16498
Prepared in cooperation with Johns Hopkins Univ., Silver Spring, Md. Applied Physics Lab., CF-2902.

Descriptors: (*Panels (Structural), *Boundary value problems), Integration, Difference equations, Cantilever beams, Theses, Deflection, Metal plates.

The thesis is concerned with the application of the modified Reissner variational principle, which permits simultaneous independent variations in deflections and moments, to the study of the square cantilever plate. A technique employing numerical integration and finite differences to evaluate the integrals appearing in the modified principle is developed and applied (1) to the static deflection problem of the uniformly loaded plate and (2) to the problem of the plate vibrating in its fundamental mode. As a result of this technique, the unknowns to be evaluated are the deflections and the moments located at discrete points on the plate and not unknown coefficients satisfying polynomials which express the deflection shape and the moment distribution of the plate. The accuracy is therefore dependent only on the number of discrete points located on the plate. The use of extrapolation equations greatly increases the accuracy and the results of this thesis are in good agreement with experimental results. (Author)
AD-652 798 HC$3.00 MF$0.65

AN EXCITATION AND INSTRUMENTATION SYSTEM FOR VIBRATING PLATE STUDIES.
Master's thesis,
Texas Univ Austin Defense Research Lab
Charles Wesley Beck, II. Jun 61, 69p Rept no. DRL-467
Contract NOrd-16498
Prepared in cooperation with Johns Hopkins Univ., Silver Spring, Md. Applied Physics Lab., CF-2930.

Descriptors: (*Panels (Structural), Vibration), (*Instrumentation, Deflection), Metal plates, Transducers, Measurement, Vibrators (Mechanical), Theses.

The thesis presents the details of the design, construction, calibration, and operation of an excitation and dynamic deflection instrumentation system to be used in studies of vibrating plates. The system presented here is designed to excite and instrument plates with maximum dimensions of 12 inches square and a thickness of 0.5 inches over a range of frequencies from 100 cps to 500 cps. Slight modifications in the equipment would allow its use on other sizes of plates and at other frequencies. The merit in the system presented here is the fact that the deflection instrumentation attaches no mass to the plate under study. For test plates made of magnetic materials, the excitation system attaches no mass either. At worst, on non-magnetic plates, an attached mass on the order of 3 grams is all that is required. Consequently, plate parameters are little affected by the complete instrumentation system. (Author)
AD-652 802 HC$3.00 MF$0.65

FEASIBILITY STUDY OF BURIED ANCHORS IN POLAR SNOW.
Cold Regions Research and Engineering Lab Hanover N H
For primary bibliographic entry see Field 8L.
AD-652 869 HC$3.00 MF$0.65

PSYCHOLOGICAL, ENGINEERING, AND PHYSIOLOGICAL EVALUATION OF SHELTER EQUIPMENT AND PROCEDURES. VOLUME I. SUMMARY AND REVIEW.
Final rept.,
General American Transportation Corp Niles Ill General American Research Div
H. A. Meier, and G. Engholm. Feb 67, 35p Rept no. GARD-1292-Vol-I
Contract OCD-PS-66-9
See also Volume II - AD-653 019; Volume III - AD-653 020.

Descriptors: (*Fallout shelters, *Civil defense systems), Systems engineering, Ventilation, Cooling, Management engineering, Instruction manuals, Physiology, Psychology, Food, Water supplies, Toilet facilities, Stresses.

A series of non-occupancy and shelter occupancy studies were conducted which evaluated the ability of typical shelterees to use (1) a Package Ventilation Kit (PVK), (2) three types of Effective Temperature meters, (3) a toxic gas detector, and (4) a prototype drinking water dispenser; and to evaluate the ability of this equipment to integrate into the shelter system. The shelterees can assemble the PVK but cannot deploy it correctly unless they are supplied with detailed photograph-floor plan instructions. The PVK's impact on the shelter system is minimal. At a low water level, the water dispenser proved awkward. The toxic gas detector is not easily operated and the Effective Temperature meters are generally read in error.
AD-653 018 HC$3.00 MF$0.65

PSYCHOLOGICAL, ENGINEERING, AND PHYSIOLOGICAL EVALUATION OF SHELTER EQUIPMENT AND PROCEDURES. VOLUME II. LABORATORY STUDIES.
Final rept.,
General American Transportation Corp Niles Ill
General American Research Div
J. F. Hale, and H. F. Behls. Feb 67, 184p Rept no. GARD-1292-Vol-2
Contract OCD-PS-66-9
Document contains color, reproduction in B/W only. See also Volume I - AD-653 018; Volume III - AD-653 020.

Descriptors: (*Fallout shelters, *Civil defense systems), Systems engineering, Cooling, Ventilation, Management engineering, Instruction manuals, Physiology, Psychology, Water supplies.

Two series of non-occupancy tests examined the effectiveness of various kinds of instructions designed to support the use of (1) a Package Ventilation Kit (PVK), (2) three types of Effective Temperature (ET) meters, (3) a toxic gas detector, and (4) the OCD water dispenser by persons unfamiliar with these devices. In the first study, subjects were able to assemble the PVK but unable to deploy it correctly. The ET meters were generally read in error. At a low water level, the water dispenser was not used properly. In the second study, subjects were able to deploy the PVK using photograph-floor plan instructions. Prefabricated ductwork reduced the installation time, but problems with twisting of the duct occurred. A PVK instruction manual is presented which employs the results of both test series.
AD-653 019 HC$3.00 MF$0.65

PSYCHOLOGICAL, ENGINEERING, AND PHYSIOLOGICAL EVALUATION OF SHELTER EQUIPMENT AND PROCEDURES. VOLUME III. HABITABILITY STUDIES.
Final rept.,
General American Transportation Corp Niles Ill
General American Research Div
R. W. Smith, and C. A. Madson. Feb 67, 222p
Rept no. GARD-1292-Vol-3
Contract OCD-PS-66-9
See also Volume I - AD-653 018; Volume II - AD-653 019.

Descriptors: (*Fallout shelters, *Civil defense systems), Systems engineering, Cooling, Ventilation, Management engineering, Instruction manuals, Physiology, Psychology, Water supplies.

Three shelter habitability tests examined the effectiveness of instructions and job aides designed to support the use of (1) a Package Ventilation Kit, (2) Effective Temperature Meters, (3) a toxic gas detector, (4) the OCD water dispenser, (5) and other shelter equipment by untrained subjects and the effect of these equipments on the shelter organization and management. Other factors related to shelter occupancy are also discussed, such as role conflict and defections. Recommendations are given for improvement in the instructions, devices, and shelter management.
AD-653 020 HC$3.00 MF$0.65

FATIGUE OF STRUCTURAL ELEMENTS. STUDY OF RESIDUAL STRESSES IN LINEARLY VARYING BIAXIAL STRESS FIELDS.
Naval Applied Science Lab Brooklyn N Y
For primary bibliographic entry see Field 20K.
AD-653 068 HC$3.00 MF$0.65

SNOW DENSIFICATION THEORY AND ITS ENGINEERING APPLICATION.
Snow Ice and Permafrost Research Establishment Wilmette Ill
For primary bibliographic entry see Field 8L.
AD-653 134 HC$3.00 MF$0.65

AN UNDER-ICE CAMP IN THE ARCTIC.
Cold Regions Research and Engineering Lab Hanover N H
For primary bibliographic entry see Field 8L.
AD-653 150 HC$3.00 MF$0.65

ARCTIC FIELD TEST OF PORTABLE FOAM-CORE SHELTER.
Rept. for 31 Dec 65-7 Apr 66,
Arctic Aeromedical Lab Fort Wainwright Alaska
John F. Roy. Mar 67, 36p Rept no. AAL-TR-66-14

Descriptors: (*Shelters, *Construction materials), (*Structural parts, *Foundations (Structures)), Environment, Arctic regions, Cold weather tests, Styrene plastics, Expanded plastics, Portable, Ventilation, Thermal insulation, Meteorological parameters.

A lightweight portable 16 x 32 ft foamcore shelter was tested in a cold environment to determine its adequacy and potential use in an arctic environment. The Quonset-shaped structure had a foundation frame of aluminum grade beam sections fastened together with connector bolts. Panel construction was a composite of 1/4-in. thick polystyrene foam with a paper liner laminated to each side and painted with a resin-type coating. Velcro material fastened together the arches and end panels. Flooring was a synthetic tarpaulin. One-inch thick urethane foam panels provided additional insulation. The shelter was anchored with grade beam stakes and tie-down ropes. To provide temperature measurements the shelter was instrumented with copper-constantan thermocouples and thermistor probes. Test results showed the test item was a suitable general-purpose shelter for arctic use and capable of a continuous period of use or several assembly-disassembly cycles. It did not seem advantageous for use in field maneuvers where frequent movement of the structure would be necessary. If the shelter were to be used extensive in the arctic, suggested priority design modifications include: Redesign the entrance to provide a vestibule or double door for better thermal protection; use a structural floor or a flooring material that remains flexible at -40F; incorporate a suitable auxiliary insulation system; and improve the ventilation system.
AD-653 179 HC$3.00 MF$0.65

GROUND TEMPERATURE DATA OF BIOLOGICAL SIGNIFICANCE.
Final rept., Sep 63-Jun 66,
Arctic Aeromedical Lab Fort Wainwright Alaska
John F. Lee. Apr67, 15p Rept no. AAL-TR-67-2

Descriptors: (*Shelters, Arctic regions), Thermistors, Mammals, Hibernation, Thermal insulation, Instrumentation, Survival, Snow, Permafrost, Temperature, Soils, Alaska, Climatology.
Identifiers: Snow houses.

Ground temperature studies were initiated at Fairbanks, Alaska to prove data for predicting temperatures of survival shelters warmed by radiation from the earth. Some of this data is presented here in the hope it may be interesting to investigators of mammalian microclimates. Holes to depths of 10 ft were instrumented with thermistors during September 1963 and readings were taken at regular intervals until July 1966. Insulated shelters were placed in the vicinity of instrumented holes and temperature data were obtained. Temperatures were also taken inside shelters occupied by human subjects. Instrumented shelters were placed on frozen Chena River and data obtained while unoccupied and during occupancy. Nearby thermistors were frozen to river ice under snow cover and with snow removed. Temperatures of ground surface beneath snow were -6C when ambient air was -46C. When ambient air was -40C, temperatures inside shelters were as high as -8C and when shelters were occupied temperatures were over +15C. With ambient air below -40C, temperature in unoccupied shelter on the river was -9C, under snow -8C, and where sncw was removed -30C. (Author)
AD-653 180 HC$3.00 MF$0.65

AN INVESTIGATION INTO THE FATIGUE PROPERTIES OF A SINGLE SPOT WELD LAP JOINT.
College of Aeronautics, Cranfield (England).
For primary bibliographic entry see Field 20K.
For abstract, see STAR 05 14.
N67-27127 HC$3.00 MF$0.65

TRANSMISSION OF CONCENTRATED STRESSES TO A THIN WALLED SHELL.
International Information, Inc., Philadelphia, Pa.
For primary bibliographic entry see Field 20K.
For abstract, see STAR 05 14.
N67-27534 HC$3.00 MF$0.65

DESIGN OF THE CYLINDRICAL SHELL FOR CYCLIC LOADING.
Raschet Tsilindricheskoy Obolochki Na Tsiklicheskiye Nagruzki
International Information, Inc., Philadelphia, Pa.
N. Petrova-deneva. Mar 67, 15p NASA-TT-F-10743
Contract NASW-1499
Transl. Into English From Inzh. Zh. (USSR), No. 6, 1966 P 106-114

Descriptors: *Asymptotic method, *Cyclic load, *Cylindrical shell, Asymptote, Boundary, Closed, Cross, Cyclic, Cylinder, Design, Elasticity, Equation, Integration, Load, Method, Random, Section, Shell, Stress, Surface.

For abstract, see STAR 05 14.
N67-27535 HC$3.00 MF$0.65

STRUCTURAL MODEL STUDY OF AN ELLIPTICALLY SHAPED ARCH, DOUBLE-CURVATURE, CONCRETE DAM,
Bureau of Reclamation, Denver, Colo. Concrete and Structural Branch.
G. L. Butler, and R. M. McCafferty. 26 Sep 66, 55p C-1210

Descriptors: (*Dams, Structural properties), Model tests, Concrete, Models (Simulations), Curved profiles, Stresses, Deformation, Deflection, Hydrostatic pressure, Loading (Mechanics).

A structural model research study of an elliptical arch, double-curvature concrete dam was conducted in conjunction with an analytical study to evaluate new shapes for concrete arch dams. Model material used for both dam and foundation was a mixture of plaster, 'Celite,' and water. A scale ratio of 300:1 was used. The model dam and foundation material had the same modulus of elasticity, allowing a portion of the foundation to be cast monolithically with the dam. This method of construction eliminated a joint of epoxy between the dam and foundation. After instrumentation with strain gages and dial gages, the model dam was mercury loaded to its normal water surface. Stress distribution and deformation of the dam were then determined for this hydrostatic load. Typical distribution and magnitude of stresses and deflections for a concrete arch dam were observed at most locations. However, compressive stress of 1412 psi was observed on the downstream face, as well as an unusual stress distribution directly opposite on the upstream face. Maximum tensile stress was 300 psi, and maximum radial deflection was 2.66 in. Distribution of the hydrostatic load to the foundation was very satisfactory, and the design appears feasible for future concrete dams. (Author)
PB-173 481 HC$3.00 MF$0.50

MINIMUM WEIGHT STRUCTURAL SANDWICH.

Research note,
Forest Products Lab., Madison, Wis.
Edward W. Kuenzi. Oct 65, 17p FPL-086

Descriptors: (*Sandwich construction, Weight), (*Load distribution, Sandwich construction), Sandwich panels, Structural parts, Bending, Buckling (Mechanics), Honeycomb cores.

Presents theoretical analyses for determination of dimensions of structural sandwich of minimum weight that will have certain stiffness and load-carrying capabilities. Includes a brief discussion of the resultant minimum weight configurations.
PB-173 583 HC$3.00 MF$0.65

FIFTEENTH-YEAR EVALUATION OF EXPERIMENTAL TEST LININGS IN SHASTA DAM PENSTOCK.
Final summary rept.,
Bureau of Reclamation, Denver, Colo. Chemical Engineering Branch.
J. L. Kiewit, and H. K. Uyeda. 30 Jun 66, 44p ChE-59

Descriptors: (*Dams, Plastic paints), (*Plastic paints, Protective treatments), Metal coatings, Corrosion inhibition, Abrasives, Erosion, Degradation, Drainage, Paints.

Twenty-five protective lining materials were applied during 1949 in short test sections to a 160-ft length of interior of the 15-ft-dia Unit 5 penstock at Shasta Dam on the Sacramento River in California. The purpose was to field test the most promising linings for their resistance to continuous fresh water immersion. Nearly annual inspections disclosed that many paints developed serious defects or failure early in the test; only 10 materials were unaffected at the fifth-year inspection. By the fifteenth year, 7 remained in excellent condition. These included VR-3 vinyl resin paint, a phenolic paint, and 5 somewhat similar phenolic red lead paint systems. VR-6 vinyl resin paint is considered also to have performed with the preceding coatings. Coal-tar enamel is performing well in the remainder of the 5 Shasta penstocks. The deterioration history of paints in this test suggests that defect-free performance by organic coatings in this exposure presages at least 15 yrs of effective protection against corrosion.
PB-173 590 HC$3.00 MF$0.65

COMPUTER TECHNIQUES APPLIED TO THE ANALYSIS AND DESIGN OF TWO COLUMN BENT RIGID FRAME HIGHWAY BRIDGE PIERS AND OTHER BRIDGE DESIGN PROBLEMS,
South Carolina Univ., Columbia. Dept. of Civil Engineering.
For primary bibliographic entry see Field 13B.
PB-173 863 HC$3.00 MF$0.65

HOME MAINTENANCE EQUIPMENT AND SUPPLIES IN THE UNITED KINGDOM.
Comart Research Ltd., London (England).
For primary bibliographic entry see Field 5C.
PB-174 788 HC$3.00 MF$0.65

DEVELOPMENT OF NOTATION AND DATA STRUCTURE FOR COMPUTER APPLICATIONS TO BUILDING PROBLEMS.
Bolt Beranek and Newman, Inc., Van Nuys, Calif.
Mar 67, 109p Rept. no. 1398
Contract CST-1353

Descriptors: (*Buildings, *Data processing systems), (*Coding, Information retrieval), Structures, Standards, Design, Construction, Shelters, Syntax, Symbols, Analysis, Programming languages.
Identifiers: List processing.

This report describes the development of a generalized building notation system for computer usage. The system consists of two main parts: a scheme of notation, and a data structure to implement that notation in computer storage. The work concerns primarily the internal storage of building information in a computer, rather than with the input and output of information. The report outlines in general terms the problems attendant to computer handling of building information, and describes in detail a notation scheme and computer-storage data structure that solves many of these problems. (Author)
PB-174 795 HC$3.00 MF$0.65

14. METHODS AND EQUIPMENT

14A. COST EFFECTIVENESS

DESIGN OF A STATUS MONITOR USING COST- EFFECTIVENESS ANALYSIS.
National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
P. B. Pease. May 67, 34p NASA-TM-X-55793, X-521-67-208

Descriptors: *Cost estimate, *Ground station, *Operations research, *Satellite tracking, Analysis, Cost, Design, Effect, Engineering, Estimate, Facility, Ground, Hardware, Implementation, Monitor, Network, Operational, Research, Satellite, Station, Test, Tracking.

For abstract, see STAR 05 14.
N67-27566 HC$3.00 MF$0.65

PRINTING - REPRODUCTION SYSTEM ANALYSIS FOR THE OFFICE OF TECHNICAL SERVICES,
Office of Technical Services, Washington, D.C.
For primary bibliographic entry see Field 5B.
PB-174 737 HC$3.00 MF$0.65

POST AUDITING MACHINE TOOL INVESTMENTS,
Union Carbide Corp., Oak Ridge, Tenn. Y-12 Plant.
For primary bibliographic entry see Field 13I.
For abstract, see NSA 21 02.
Y-1557 HC$3.00 MF$0.65

14B. LABORATORIES, TEST FACILITIES, AND TEST EQUIPMENT

RESYNCHRONIZATION OF REMOTE CLOCKS USING VLF RECEPTION FROM TWO OR MORE TRANSMITTERS.
Technical rept.,
Texas Univ., Austin. Defense Research Lab.
J. R. Wright. 20 Mar 63, 9p DRL -500
Contract NOrd-16498
Prepared in cooperation with Johns Hopkins Univ., Silver Spring, Md. Applied Physics Lab., CF-3016.

Descriptors: (*Synchronization (Electronics), Clocks), Very low frequency, Errors, Multipath transmission, Radio transmitters, Mathematical analysis.

A method for reestablishing lost synchronization between remote clocks using VLF transmissions from two or more stations is suggested. (Author)
AD-416 310 HC$3.00

DESIGN OF A MINIATURE WATERCOOLED INTERNAL STRAIN GAGE WIND TUNNEL BALANCE,
Naval Ordnance Lab., White Oak, Md.
Eugene V. Horanoff. Nov 65, 34p NOLTR-64-137, Aerodynamics Research-230

Descriptors: (*Strain gages, *Wind tunnels), Design, High-temperature research, Environmental tests, Water, Cooling, Performance (Engineering), Tests.

The design of a sensitive, miniature 3-component watercooled strain gage balance capable of operating in a high temperature environment is described. This balance has been used to measure axial force, normal force and pitching moment in the U. S. Naval Ordnance Laboratory's Hypersonic Research Tunnel at Mach 17 and a stagnation temperature of 4000₁E. Ten degree included angle cone models with different nose radii were tested. The axial and pitch forces were on the order of .005 pounds. The report describes the balance used in obtaining the data and the performance of the balance itself. Typical curves have been shown of the axial and pitch forces and pitching moment recorded by the balance for evaluation purposes. (Author)
AD-473 860 HC$3.00 MF$0.65

DEVELOPMENT OF AN INTEGRATED ERGOMETER/LOWER BODY NEGATIVE PRESSURE SYSTEM.
Lockheed Missiles and Space Co., Sunnyvale, Calif. Biotechnology.
For primary bibliographic entry see Field 6S.
AD-644 224 HC$3.00 MF$0.65

RECENT DEVELOPMENTS IN HEAT-TRANSFER-RATE, PRESSURE, AND FORCE MEASUREMENTS FOR HOTSHOT TUNNELS,
Arnold Engineering Development Center, Arnold Air Force Station, Tenn.
R. L. Leford, W. E. Smotherman, and C. T. Kidd.
Jan 67, 32p AEDC-TR-66-228
Contract AF 40 (600)-1200
Prepared in cooperation with ARO, Inc., Tullahoma, Tenn. Presented at International Congress on Instrumentation in Aerospace Simulation Facilities (2nd), sponsored by the Inst. of Electronic and Electrical Engineers.

Descriptors: (*Wind tunnels, *Transducers), (*Heat transfer, Wind tunnels), (*Pressure, Wind tunnels), (*Force (Mechanics), Wind tunnels), Measurement, Performance (Engineering).
Identifiers: Hotshot wind tunnels.

Heat-transfer rate, pressure, and force are essential parameters which must be measured in the operation of a hotshot wind tunnel. Transducers of the proper size, range, and time response required for making these measurements are not generally available on a commercial basis. Therefore, developmental programs directed towards satisfaction of these measurement requirements were undertaken. As a result of these programs, transducers were developed which enabled these measurements to be made. Recent developments have resulted in measurement capabilities and accuracies which are superior to those of transducers which were developed early in these programs (about 1960). A description of these improved transducers and their performance characteristics is included. (Author)
AD-645 764 HC$3.00 MF$0.65

THE DESIGN AND OPERATION OF AN R AND D CLEAN ROOM COMPLEX FOR GUIDANCE AND CONTROL SYSTEMS,
Army Missile Command, Redstone Arsenal, Ala. Army Inertial Guidance and Control Lab.
Wilber H. Gibson. 12 Jan 66, 33p RG-TN-66-1

Descriptors: (*Clean rooms, Design), Operation, Maintenance, Control systems, Inertial guidance, Contamination, Hygiene, Personnel management,

Management control systems, Decontamination, Costs.

Contents: Design Factors; Control Levels; Description of the Clean Room Complex: Plant Layout; Architectural Features; Air Conditioning; Special Utilities; Operation: Personnel Requirements; Security; Entry and Exit Procedures; Equipment Entry and Exit Procedures; Maintenance and Control Procedures: Class III Clean Work Stations; Class II Clean Room; Class I Clean Room; Periodic Maintenance; Special Tests for Contamination; Special Equipment; Maintenance and Cleaning Equipment; Cost.
AD-646 388 HC$3.00 MF$0.65

FREE-FLIGHT MEASUREMENT OF LOCAL TURBULENT SKIN FRICTION ON AN RM-10 VEHICLE.
Texas Univ Austin Defense Research Lab
For primary bibliographic entry see Field 20D.
AD-652 801 HC$3.00 MF$0.65

AN EXCITATION AND INSTRUMENTATION SYSTEM FOR VIBRATING PLATE STUDIES.
Texas Univ Austin Defense Research Lab
For primary bibliographic entry see Field 13M.
AD-652 802 HC$3.00 MF$0.65

A REVIEW OF GAS CHROMATOGRAPHIC-MASS SPECTROMETRIC METHODS OF ANALYSIS.
Naval Research Lab Washington D C
For primary bibliographic entry see Field 7D.
AD-652 823 HC$3.00 MF$0.65

USE OF FLUORESCENT MATERIALS AND ULTRAVIOLET LIGHTING TO CONTROL VISUAL SIMULATION MODEL LIGHTING FOR TELEVISION IMAGE PICKUP.
Systems Engineering Group Wright-Patterson AFB Ohio
For primary bibliographic entry see Field 17B.
AD-652 838 HC$3.00 MF$0.65

ELECTRIC RESPONSE OF LEAD ZIRCONATE TITANATE CERAMICS TO TEMPERATURE FLUCTUATIONS,
Massachusetts Inst of Tech Cambridge Research Lab of Electronics
George C. Maling, Jr., and Uno Ingard. 17 Oct 66, 1p
Contracts DA-36-039-AMC-03200 (E), Nonr-1841 (42)
Availability: Published in Review of Scientific Instruments v38 n3 p431-2 Mar 1967.

Descriptors: (*Temperature sensitive elements, Transducers), (*Transducers, Thermal properties), Ceramic materials, Lead compounds, Zirconates, Titanates, Sensitivity, Temperature.
Identifiers: Electrothermal transducers.

While studying shock waves it was observed that the lead zirconate titanate ceramic pressure transducers used in this work were quite sensitive to temperature fluctuations. In fact, when mounted in a certain way, cylindrically shaped transducer elements recorded the temperature distribution rather than the pressure distribution in the shock waves. As a further illustration of the thermal sensitivity of the transducer, it can be mentioned that temperature fluctuations produced by spoken words in front of a person's mouth could be observed. This electrothermal effect is due, presumably, to the piezoelectric field produced by thermal stresses in the ceramic.
AD-652 868 Not available from CFSTI.

AN UP-DOWN COUNTER FOR USE WITH SHOCK-TUBE INSTRUMENTATION,
Harry Diamond Labs Washington D C
Gordon D. North. Mar 67, 22p Rept no. HDL-TM-67-5

Descriptors: (*Shock tubes, *Timing devices), Instrumentation, Design, Pressure, Shock waves, Circuits, Packaging, Calibration.

An up-down counter was designed and built to provide precise synchronization of instrumentation used with the HDL pressure-driven shock tube. The counter is intended to trigger instruments measuring phenomena associated with the arrival of a shock wave. The counter described demonstrated proper operation over a range of 75 to 145 microseconds, repeatable to less than plus or minus 1 microsecond. The report includes a detailed description of the design and techniques employed in this application. (Author)
AD-652 876 HC$3.00 MF$0.65

FLEXIBLE-MEMBRANE FABRY-PEROT INTERFEROMETER,
Massachusetts Inst of Tech Cambridge Research Lab of Electronics
Uno Ingard, and Hoshea Lewenstein. 1967, 1p
Contracts DA-36-039-AMC-03200 (E), Nonr-1841 (42)
Availability: Published in American Journal of Physics v35 n3 p285 Mar 1967.

Descriptors: (*Interferometers, Membranes), (*Speech representation, Interferometers), Films, Metal coatings, Mirrors, Optical equipment components.

A description is given of a simple version of a Fabry-Perot interferometer which utilizes commercially-produced metallized plastic film as plates. Since such an interferometer is quite sensitive to pressure fluctions, it may be of use in investigations of speech patterns.
AD-652 895 Not available from CFSTI.

ABSOLUTE ELECTRIC FIELD MEASUREMENTS USING FIELD MILLS,
Naval Research Lab Washington D C
For primary bibliographic entry see Field 20C.
AD-652 928 HC$3.00 MF$0.65

DASA-AEC-LOVELACE FOUNDATION BLAST-SIMULATION FACILITY,
Lovelace Foundation for Medical Education and Research Albuquerque N Mex
For primary bibliographic entry see Field 6U.
AD-653 021 HC$3.00 MF$0.65

THE NMRI DEEP ISOLATION LABORATORY.
Naval Medical Research Inst Bethesda Md
For primary bibliographic entry see Field 5J.
AD-653 074 HC$3.00 MF$0.65

RELATIONSHIP BETWEEN THE MINEX AND THE HELIUM-DRIVEN MODIFIED COKER IN THE MEASUREMENT OF JET FUEL THERMAL STABILITY,
Air Force Aero Propulsion Lab Wright-Patterson AFB Ohio
For primary bibliographic entry see Field 21D.
AD-653 188 HC$3.00 MF$0.65

A REAL TIME FOURIER TRANSFORM SYNTHESIZER,
Utah State Univ Logan Electro-Dynamics Labs
For primary bibliographic entry see Field 17H.
AD-653 200 HC$3.00 MF$0.65

SPECTROMETER SYSTEM FOR STUDYING ABSORPTION FROM EXCITED METASTABLE STATES OF IONS IN CRYSTALS,
Naples Univ (Italy) Istituto Di Meccanica Delle Macchine
For primary bibliographic entry see Field 20F.
AD-653 244 Not available from CFSTI.

SOME BAYESIAN STRATIFIED TWO-PHASE SAMPLING RESULTS.
Wisconsin Univ Madison Dept of Statistics
For primary bibliographic entry see Field 12B.
AD-653 264 HC$3.00 MF$0.65

THE DESIGN OF FLAT-SCORED HIGH-PRESSURE DIAPHRAGMS FOR USE IN SHOCK TUNNELS AND GAS GUNS,
Naval Ordnance Lab White Oak Md
J. J. Rast. Jan 61, 34p Rept no. NAVORD-6865, Ballistics Research-29

Descriptors: (*Diaphragms (Mechanics), Design), (*Shock tubes, Diaphragms (Mechanics)), Light gas guns, Hypersonic wind tunnels, High-pressure research, Metals, Production.

An empirical design curve for flat-scored metal diaphragms is presented, which predicts burst pressures up to 40,000 psi. Also discussed are methods of holding the diaphragms and materials used in their fabrication. (Author)
AD-653 285 HC$3.00 MF$0.65

PLASTIC-TUBE CORING TECHNIQUE FOR UNCONSOLIDATED WET SAND.
Yale Univ New Haven Conn Dept of Geology
For primary bibliographic entry see Field 8G.
AD-653 331 Not available from CFSTI.

EXTREMELY SMALL AND SIMPLE PULSE GENERATOR FOR INJECTION LASERS,
Army Electronics Labs Fort Monmouth N J
For primary bibliographic entry see Field 20E.
AD-653 344 Not available from CFSTI.

UNITS OF WEIGHT AND MEASURE. INTERNATIONAL (METRIC) AND U.S. CUSTOMARY,
National Bureau of Standards, Washington, D. C. Inst. for Applied Technology.
L. J. Chisholm. May 67, 253p
Supersedes NBS Misc Pub-233. Hard copy available from Superintendent of Documents, GPO, Washington, D. C. 20402, $1.50.

Descriptors: (*Weight, Tables), (*Measurement, Tables), Linear systems, Standards, United States Government, History, France, Volume, Standardization.
Identifiers: Metric system, Conversion tables, International system (SI), U. S. Customary System.

The primary purpose of this publication is to make available the most often needed weights and measures conversion tables--conversions between the U. S. Customary System and International (Metric) System. A secondary purpose is to present a brief historical outline of the International (Metric) System--following it from its country of origin, France, through its progress in the United States. (Author)
NBS Misc Pub-286 HC$1.50 MF$0.65

DEVELOPMENT OF AN ELECTRON DENSITY PROBE FINAL REPORT, 28 MAY 1965 - 28 FEB. 1966.
General Applied Science Labs., Inc., Westbury, N. Y.
D. Attwood, and H. Medecki. 26 Jun 66, 136p
NASA-CR-84150, TR-594
Contract NAS5-9881

Descriptors: *Electron density, *Electron probe, *Reentry vehicle, *Separated flow, Apollo project, Calibration, Cavity, Charge, Density, Dielectric, Diffusion, Electromagnetic, Electron, Flow, Heat transfer, Measurement, Particle, Perturbation, Plasma, Probe, Reentry, Separation, Shock, Vehicle.

Group 14B—Laboratories, test facilities, and test equipment

For abstract, see STAR 05 14.
N67-26514 HC$3.00 MF$0.65

CALCULATION OF THE AERODYNAMIC CAPACITIES OF THE DVL SUPERSONIC WIND TUNNELS AT PORZ- WAHN.
Deutsche Versuchsanstalt Fur Luft- Und Raumfahrt, Porz (West Germany). Institut Fur Angewandte Gasdynamik.
For primary bibliographic entry see Field 1A.
For abstract, see STAR 05 14.
N67-27196 HC$3.00 MF$0.65

DESCRIPTION OF TWO NEW PROBES FOR ENTHALPY AND PRESSURE MEASUREMENTS IN HIGH-TEMPERATURE GASES.
Deutsche Versuchsanstalt Fur Luft- Und Raumfahrt, Stuttgart (West Germany). Institut Fur Plasmadynamik.
For primary bibliographic entry see Field 20I.
For abstract, see STAR 05 14.
N67-27200 HC$3.00 MF$0.65

EFFECTIVENESS OF ENVIRONMENT-SIMULATION TESTING FOR SPACECRAFT.
National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
J. C. Neu, and A. R. Timmins. Jun 67, 13p
NASA-TN-D-4009

Descriptors: *Environment simulation, *Ground test, *Spacecraft reliability, *Test method, Effectiveness, Environment, Experiment, Facility, Failure, Ground, Method, Nasa program, Operation, Purpose, Reliability, Simulation, Spacecraft, Test, Unmanned.

For abstract, see STAR 05 14.
N67-27222 HC$3.00 MF$0.65

DYNAMIC SIMULATION OF LUNAR MODULE DOCKING WITH APOLLO COMMAND MODULE IN LUNAR ORBIT.
National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
J. B. Cobb, H. G. Hatch, Jr., and J. E. Pennington. Jun 67, 28p NASA-TN-D-3972
Contract 125-19-01-06-23

Descriptors: *Apollo spacecraft, *Docking, *Lunar orbit and landing approach simulator, Aid, Approach, Ascent, Command, Control, Dynamic, Landing, Lunar, Model, Module, Orbit, Pilot, Pressure, Simulation, Simulator, Spacecraft, Stage, Suit, Visibility.

For abstract, see STAR 05 14.
N67-27272 HC$3.00 MF$0.65

OPACITY OF HOT, HIGHLY COMPRESSED HYDROGEN FINAL REPORT.
Naval Ordnance Lab., White Oak, Md.
G. L. Hammond, and G. T. Lalos. 16 Nov 66, 52p
NASA-CR-72116, NOLTR-66-202
NASA ORDER C-80708

Descriptors: *Compressor, *Hydrogen, *Opacity, Absorption, Emission, Equilibrium, Helium, High pressure, High temperature, Impurity, Line, Metal, Mixture, Piston, Spectrum.

For abstract, see STAR 05 14.
N67-27303 HC$3.00 MF$0.65

BEYOND THE DOOR IS AN UNKNOWN PLANET.
Za Dver'yu -- Neznakomaya Planeta
International Information, Inc., Philadelphia, Pa.
L. Repin. May 67, 4p NASA-TT-F-11062
Contract NASW-1499
Transl. Into English From Komosomol'skaya Pravda (USSR), 21 Jan. 1967 P 4

Descriptors: *Atmospheric composition, *Environment simulation, *Planetary atmosphere, Atmosphere, Chamber, Composition, Daily, Environment, Facility, Mars (planet), Planetary, Pressure, Radiation, Simulation, Solar, Spectrum, Ultraviolet, Variation.

For abstract, see STAR 05 14.
N67-27533 HC$3.00 MF$0.65

DESIGN DETAILS FOR HELIUM HEATER.
Wyle Labs., Inc., Huntsville, Ala. Research Staff.
R. C. Potter. 18 Nov 66, 20p NASA-CR-84458, TM-66-39
Contract NAS8-11312

Descriptors: *Heater, *Helium, *Nozzle flow, Aerodynamics, Air, Design, Expansion, Flow, Free, Mach number, Nozzle, Pressure, Reservoir, Shock, Structure, Thermal, Thermodynamics.

For abstract, see STAR 05 14.
N67-27621 HC$3.00 MF$0.65

STRUCTURAL MODEL STUDY OF AN ELLIPTICALLY SHAPED ARCH, DOUBLE-CURVATURE, CONCRETE DAM,
Bureau of Reclamation, Denver, Colo. Concrete and Structural Branch.
For primary bibliographic entry see Field 13M.
PB-173 481 HC$3.00 MF$0.50

ON ATMOSPHERIC SIMULATION: A COLLOQUIUM.
National Center for Atmospheric Research, Boulder, Colo.
For primary bibliographic entry see Field 4A.
PB-173 777 HC$3.00 MF$0.65

REPORT OF NRL PROGRESS.
Naval Research Lab., Washington, D. C.
May 67, 50p
Annual subscription $15.00 ($18.00 foreign).

Descriptors: (*Naval research, Reports), (*Cyclotrons, Scientific research), Atmosphere, Astrophysics, Chemistry, Mechanics, Metallurgy, Ceramic materials, Nuclear physics, Atoms, Optics, Radio communication systems, Radar, Sound.

Complete papers: Cyclotron dedication address; and The NRL sector-focusing cyclotron. Summaries are given of research in the follong fields: atmosphere and astrophysics, chemistry, mechanics, metallurgy and ceramics, nuclear and atonic physics, optical physics, radio, radar, and sound.
PB-174 738 HC$3.00 MF$0.65

OSCILLOSCOPE PREAMPLIFIER TYPE B OR 53/54B (TEKTRONIX).
Bureau of Naval Weapons Representative, Pomona, Calif. Metrology Engineering Center.
For primary bibliographic entry see Field 9C.
PB-174 798 HC$3.00 MF$0.65

POWER OSCILLATOR MICRODOT 408, 408 B.
Bureau of Naval Weapons Representative, Pomona, Calif. Meteorology Engineering Center.
For primary bibliographic entry see Field 9C.
PB-174 830 HC$3.00 MF$0.65

ALTITUDE CONTROLLER TESTER, PART NO. VPT-10G-11414A, VPT-10G-11414B, VPT-10E-12510, VPT-10G-12510A, AND VPT-10G-12510B.
Naval Air Systems Command, Washington, D.C.
For primary bibliographic entry see Field 9C.
PB-174 831 HC$3.00 MF$0.65

CABIN TEMPERATURE CONTROL SYSTEM TEST SET, PART NO. 70000143 FEDERAL STOCK NO. (TELEDYNE CONTROL SYSTEMS).
Naval Air Systems Command, Washington, D.C.
For primary bibliographic entry see Field 9C.
PB-174 832 HC$3.00 MF$0.65

OSCILLOSCOPE PREAMPLIFIER, TYPE D OR 53/54D (TEKTRONIX).
Bureau of Naval Weapons Representative, Pomona, Calif. Meteorology Engineering Center.
For primary bibliographic entry see Field 9C.
PB-174 833 HC$3.00 MF$0.65

RANDOM-NOISE GENERATOR GENERAL RADIO 1390-B.
Bureau of Naval Weapons Representative, Pomona, Calif. Metrology Engineering Center.
For primary bibliographic entry see Field 9C.
PB-174 851 HC$3.00 MF$0.65

FIXED COAXIAL ATTENUATORS 0 TO 50DB 0.2 TO 10.0 GHz.
Bureau of Naval Weapons Representative, Pomona, Calif. Metrology Engineering Center.
For primary bibliographic entry see Field 9C.
PB-174 853 HC$3.00 MF$0.65

ENGINE-ROTOR SYSTEM TEST SET AN/USM-202. PART NO. Y63-315880-481-1, PART NO. Y63E880045-001.
Naval Air Systems Command, Washington, D.C.
For primary bibliographic entry see Field 9C.
PB-174 854 HC$3.00 MF$0.65

AUDIO OSCILLATOR WAVEFORMS 401H.
Bureau of Naval Weapons Representative., Pomona, Calif. Metrology Engineering Center.
For primary bibliographic entry see Field 9C.
PB-174 855 HC$3.00 MF$0.65

OSCILLOSCOPE PREAMPLIFIER TYPE H OR 53/54H (TEKTRONIX).
Bureau of Naval Weapons Representative, Pomona, Calif. Metrology Engineering Center.
For primary bibliographic entry see Field 9C.
PB-174 856 HC$3.00 MF$0.65

IMPEDANCE BRIDGE GENERAL RADIO 650-A, OJ-1, OJ-2, AND OJ-3.
Bureau of Naval Weapons Representative, Pomona, Calif. Meteorology Engineering Center.
For primary bibliographic entry see Field 9C.
PB-174 858 HC$3.00 MF$0.65

AN INSPECTION DATA LOGGING SYSTEM (DLS),
Union Carbide Corp., Oak Ridge, Tenn. Y-12 Plant.
For primary bibliographic entry see Field 13I.
For abstract, see NSA 21 12.
Y-1565 HC$3.00 MF$0.65

14C. RECORDING DEVICES

DIGITAL RECORDING AND PLAYBACK EQUIPMENT (DRAPE).
Technical memo.,
Johns Hopkins Univ Silver Spring Md Applied Physics Lab
E. R. Bernheisel, and L. C. Queen. Mar 67, 147p
Rept no. TG-897
Contract NOw-62-0604

Descriptors: (*Digital recording systems, *Magnetic tape), Operation, Maintenance, Monitors, Signals, Wiring diagrams, Timing circuits, Logic circuits, Pulse generators, Scalers, Multiplex.

The technical manual describes the Digital Recording and Playback Equipment (DRAPE) and provides information necessary for operating that equipment and maintaining it in an operable state. The DRAPE acquires both analog and digital data from multiple sources and converts them to serial PCM signals which are then recorded on magnetic tape. To ensure that it is operating correctly and that valid data are being acquired, DRAPE recovers the data immediately after they are recorded and converts them to analog signals. These signals may then be applied to a recording device for monitoring purposes. Prior to the acquisition of data, header information may be entered through switches on the front panel and recorded to aid identification.

AD-652 817 HC$3.00 MF$0.65

SOLID STATE ELECTRONIC CIRCUITS FOR THE LINE RECORDER MASS SPECTROMETER,

Oak Ridge Gaseous Diffusion Plant, Tenn.

For primary bibliographic entry see Field 18D.

For abstract, see NSA 21 12.

K-1692 HC$3.00 MF$0.65

INSTRUCTION MANUAL FOR HRIR MODIFICATIONS TO THE APTS GROUND STATIONS USING MUIRHEAD FACSIMILE RECORDERS.

Radio Corp. of America, Princeton, N. J. Astro-electronics Div.

For primary bibliographic entry see Field 9F.

For abstract, see STAR 05 06.

N67-15456 HC$3.00 MF$0.65

SERVO CONTROL AND DATA SYNCHRONIZATION STUDY.

Borg-Warner Controls Div., Borg-Warner Corp., Santa Ana, Calif. Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.

For primary bibliographic entry see Field 9B.

For abstract, see STAR 05 14.

N67-26519 HC$3.00 MF$0.65

A SIMPLE ELECTRONIC INSTRUMENT FOR CONTINUOUS INTEGRATION OF TIME-VARIABLE MEASURING FUNCTIONS.

Deutsche Versuchsanstalt Fur Luft- Und Raumfahrt, Munich (West Germany). Institut Fuer Physik Der Atmosphere.

For primary bibliographic entry see Field 18D.

For abstract, see STAR 05 14.

N67-27129 HC$3.00 MF$0.65

14D. RELIABILITY

A HILLCLIMBING TECHNIQUE USING PIECEWISE CUBIC APPROXIMATION,

Purdue Univ Lafayette Ind School of Electrical Engineering

For primary bibliographic entry see Field 9C.

AD-653 215 HC$3.00 MF$0.65

RELIABLE COMPUTATION WITH UNRELIABLE ELEMENTS.

Imperial Coll. of Science and Technology, London (England). Electrical Engineering Dept.

For primary bibliographic entry see Field 9B.

For abstract, see STAR 05 14.

N67-26806 HC$3.00 MF$0.65

14E. REPROGRAPHY

TEAM PROCEDURES IN IMAGE INTERPRETATION.

Technical research note,

Army Personnel Research Office, Washington, D. C.

Stanley F. Bolin, Robert Sadacca, and Harold Martinek. Dec 65, 38p APRO-TRN-164

Descriptors: (*Photointerpretation, Group dynamics), Aerial photography, Performance tests, Army personnel, Processing, Military psychology, Aerial reconnaissance, Analysis of variance.

The present study was one in a series concerned with the development of effective image interp reter team techniques and organization. Ten different team procedures were compared with each other and with individual interpreters on eight performance tests based on photography from four aerial surveillance missions of World War II and four missions flown during the Korean war. Degree of cooperation and working methods were systematically varied in 80 matched teams of two or three Army image interpreters. Rights and wrongs scores were based on a consensus of either two or three team members. Three-man teams, with individuals working independently, proved consistently superior to the average individual interpreter attaining the same level of completeness as the average individual with substantial increases in accuracy. On the eight-mission performance tests used in this experiment, the three-man independent teams had average accuracy scores ranging from 52% to 100% versus 12% to 39% for the average individual. Two-man independent teams also showed gains in accuracy but with reduced completeness compared with individual performance.

AD-480 533 HC$3.00 MF$0.65

SEASONAL CHANGE REVEALED BY TIME-LAPSE PHOTOGRAPHY.

Army Natick Labs Mass Earth Sciences Div

For primary bibliographic entry see Field 8F.

AD-652 732 HC$3.00 MF$0.65

SOME QUESTIONS RELATED TO THE MATHEMATICAL DESCRIPTION OF THE PHOTOGRAPHIC PROCESS,

HRB-Singer Inc State College Pa

Erika A. Mares. Apr 67, 24p Rept no. HRB-352.16-R-3

Contract Nonr-3818 (00)

Descriptors: (*Photogrammetry, Mathematical analysis), (*Photographic techniques, Mathematical analysis), Projective geometry, Photographic images, Equations, Aerial photographs, Correlation techniques.

The mathematical relationship between the points of two planes that have been mapped onto one another by the photographic process is investigated. The study is in essence expository and was motivated by a question concerning the ability to map one photographic image of a plane object onto a second image in such a way that corresponuing points correspond to the same object or ground point. While in theory this is shown to be possible, provided certain conditions can be satisfied, any application would have to take into consideration the effect of errors contained in measured data. The error analysis is not pursued in this report. (Author)

AD-653 083 HC$3.00 MF$0.65

A DIGITAL APPROACH TO PHOTOGRAPHIC IMAGE QUALITY EVALUATION,

HRB-Singer Inc State College Pa

Gene A. Markel, and David J. Panzl. May 67, 45p Rept no. HRB-352.16-R-5

Contract Nonr-3818 (00)

Descriptors: (*Photographic images, Analysis), (*Photointerpretability, A nalysis), Photographic reconnaissance, Digital systems, Digital computers, Brightness, Photographic contrast, Photographic acutance, Photographic scale, Resolution, Aerial photographs.

The report describes a research program concerned with the investigation of digital techniques for image quality evaluation. The quality of an image here is taken to mean its interpretability. A sample of reconnaissance imagery was digitized and then analyzed by digital computer to generate measurements of certain physical characteristics of each picture in the sample. A clustering technique was used to determine decision spaces based upon these measurements. The quality of any new test image then would be determined by assigning it to the quality category associated with the cluster having the nearest center of mass. The ideas discussed appear to have some potential value for further investigation. (Author)

AD-653 084 HC$3.00 MF$0.65

SYSTEMS THEORY AND THE ANALYSIS OF PHOTO-OPTICAL PROCESSES,

HRB-Singer Inc State College Pa

M. P. Dutko, E. T. Nelson, and G. A. Markel. Apr 67, 28p Rept no. HRB-352.16-R-4

Contract Nonr-3818 (00)

Descriptors: (*Photographic equipment, *Systems engineering), (*Photographic techniques, Analysis), Optical equipment, Photographic images, Resolution, Electron optics, Nonlinear systems, Chemistry, Information theory, Fourier analysis.

Some criteria and techniques currently used for the evaluation and analysis of photo-optical systems are discussed. This includes a discussion of resolution and sharpness, photographic spread functions, and modulation transfer functions. A critical appraisal is made of appealing analogies between electronic systems and optical systems, with emphasis placed on analytical techniques that would be applicable to more than one component of a photographic system. Some attention is given to the advantages and limitations of using analogies from non-linear systems theory in this context, and existing chemical theory also is taken into consideration. It is observed, in conclusion, that a considerable amount of further research would be necessary in order to tie these several theories together in any useful way. (Author)

AD-653 110 HC$3.00 MF$0.65

INSTRUCTION MANUAL FOR HRIR MODIFICATIONS TO THE APTS GROUND STATIONS USING MUIRHEAD FACSIMILE RECORDERS.

Radio Corp. of America, Princeton, N. J. Astro-electronics Div.

For primary bibliographic entry see Field 9F.

For abstract, see STAR 05 06.

N67-15456 HC$3.00 MF$0.65

PULSE-TRAIN GENERATOR FOR ROCKET CAMERA.

National Aeronautics and Space Administration . Goddard Space Flight Center, Greenbelt, Md.

R. S. Lee. Jun 67, 10p NASA-TM-X-1390

Contract 821 -12-02-01-051

Descriptors: *Camera, *Pulse time modulation (ptm), *Solid state device, *Sounding rocket, Circuit, Clock, Control, Cycle, Design, Device, Film, Generator, Modulation, Power, Pulse, Rocket, Shutter, Solid, Sounding, State, Time, Timing.

For abstract, see STAR 05 14.

N67-27293 HC$3.00 MF$0.65

PRINTING - REPRODUCTION SYSTEM ANALYSIS FOR THE OFFICE OF TECHNICAL SERVICES,

Office of Technical Services, Washington, D.C.

For primary bibliographic entry see Field 5B.

PB-174 737 HC$3.00 MF$0.65

AUDIO-VISUAL EQUIPMENT IN THE UNITED KINGDOM.
Comart Research Ltd., London (England).
For primary bibliographic entry see Field 5C.
PB-174 752 HC$3.00 MF$0.65

15. MILITARY SCIENCES

15B. CHEMICAL, BIOLOGICAL, AND RADIOLOGICAL WARFARE

PRINCIPLES AND PRACTICE OF BW DECONTAMINATION: INTERLABCRATORY CONFERENCE ON MECHANISMS AND KINETICS OF VIRUS AND SPORE INACTIVATION (3rd).
Interim rept. no. 162,
Fort Detrick, Frederick, Md.
Saul Kaye, and Robert K. Hoffman. Jan 58, 93p

Descriptors: (*Biological warfare agents, Decontamination), (*Viruses, Inhibition), (*Spores, Inhibition), Symposia, Alkylation, Thermodynamics, Chemical reactions, Proteins, Viability, Reaction kinetics, Amino acids, Phenylalanine, Effectiveness, Chemical compounds, Germicides.
Identifiers: Propiolactones.

In November 1953, June 1954, and May 1955, three successive conferences were held to discuss the subject of the mechanisms and kinetics of virus and spore inactivation. The proceedings of the third conference are presented in this report.
AD-209 136 HC$3.00

15C. DEFENSE

MILDATA STUDY. VOLUME II.
Final rept., 12 Aug 63-30 Sep 64,
Honeywell Electronic Data Processing, Wellesley Hills, Mass.
1964, 191p SCL-4529-Vol-2

Descriptors: (*Data processing systems, *Army), Logistics, Weapons, Theory, Effectiveness, Fire control systems.

The major delineations found in the applications area of MILDATA are dictated by Army doctrine and experience. The areas where some computer processing already exists are Logistics, Intelligence, Fire Control, and a grouping called Personnel and Administration. Superimposed upon these areas are Command and Control requirements which in some instances use these facilities and in some instances impose a totally new set of requirements on the loose system made up of the equipment applied to the foregoing areas. In such an environment the skill of analysis combined with the quickness of response will be the most effective weapon. (Author)
AD-462 043 HC$3.00

PSYCHOLOGICAL, ENGINEERING, AND PHYSIOLOGICAL EVALUATION OF SHELTER EQUIPMENT AND PROCEDURES. VOLUME I. SUMMARY AND REVIEW.
General American Transportation Corp Niles Ill
General American Research Div
For primary bibliographic entry see Field 13M.
AD-653 018 HC$3.00 MF$0.65

PSYCHOLOGICAL, ENGINEERING, AND PHYSIOLOGICAL EVALUATION OF SHELTER EQUIPMENT AND PROCEDURES. VOLUME II. LABORATORY STUDIES.
General American Transportation Corp Niles Ill
General American Research Div
For primary bibliographic entry see Field 13M.
AD-653 019 HC$3.00 MF$0.65

PSYCHOLOGICAL, ENGINEERING, AND PHYSIOLOGICAL EVALUATION OF SHELTER EQUIPMENT AND PROCEDURES. VOLUME III. HABITABILITY STUDIES.
General American Transportation Corp Niles Ill
General American Research Div
For primary bibliographic entry see Field 13M.
AD-653 020 HC$3.00 MF$0.65

AN OPERATIONAL CONCEPT OF AN EMERGENCY MEDICAL COMMAND AND COMMUNICATIONS SYSTEM.
Final rept.,
Serendipity Associates Los Altos Calif
Richard E. Shoemaker, and Barry Korn. Feb 67, 107p Rept no. TR-44-67-1 (U)
USNRDL-TRC-67-12
Contract N00228-66-C-1616

Descriptors: (*Disasters, Command + control systems), (*Civil defense systems, Communication systems), Hospitals, Medical personnel, Nuclear warfare, Traffic, Nuclear warfare casualties, Effectiveness, Management planning, Training.

An operational concept for an Emergency Medical Command and Communications System (EMCCS) is derived from an analysis of natural disaster reports and the anticipated conditions attending a nuclear attack. A conceptual EMCCS model is described in terms of system elements, types of information circulated, communications links and traffic load determinants. A general approach to implementation of an EMCCS is described with a brief discussion of constraints imposed by current commitments and projected changes. The importance of validating the conceptual EMCCS is discussed and future research is suggested. (Author)
AD-653 105 HC$3.00 MF$0.65

15D. INTELLIGENCE

TEAM PROCEDURES IN IMAGE INTERPRETATION.
Army Personnel Research Office, Washington, D. C.
For primary bibliographic entry see Field 14E.
AD-480 533 HC$3.00 MF$0.65

CODING AND ANALYSIS OF DOCUMENTARY MATERIALS FROM COMMUNIST CHINA,
California Univ Berkeley Survey Research Center
For primary bibliographic entry see Field 5B.
AD-652 986 Not available from CFSTI.

FIELD INFRARED ANALYSIS OF TERRAIN - SPECTRAL CORRELATION PROGRAM. PART II - STANFORD ADAPTATION AND CORRECTIONS FOR USE ON LMSC PROGRAM ON IBM 7090 - 32 K MEMORY COMPUTER. PART III - VOLTAGE DRIFT CORRECTION PROCEDURES.
Stanford Univ., Calif. Remote Sensing Lab.
For primary bibliographic entry see Field 9B.
For abstract, see STAR 05 14.
N67-27643 HC$3.00 MF$0.65

15E. LOGISTICS

MOBILITY ENVIRONMENTAL RESEARCH STUDY ONE-PASS PROGRAM.
Army Tank-Automotive Center, Warren, Mich. Land Locomotion Lab.
For primary bibliographic entry see Field 13F.
AD-467 165 HC$3.00 MF$0.65

TRANSPORTATION EFFECTS IN EMERGENCIES,
Foster Associates, Inc., Washington, D. C.
John D. Freitag, Thomas E. Browne, Peter Gibbs, and Lucinda Cawley. 30 Oct 66, 154p
Contract C-366-66
Rept. to Office of Transportation Research, U. S. Dept. of Commerce.

Descriptors: (*Transportation, *Disasters), Damage, Operation, Safety, Earthquakes, Floods, Tropical cyclones, Snow, Labor, Fires, Malfunctions.

The following conclusions were drawn from the research findings: (1) Overall, the transportation network is relatively immune to physical damage from the various emergencies. (2) The network's functional capabilities are most severely affected by earthquakes, floods, hurricanes and snowstorms. (3) The capability to transport people is adversely affected in all emergencies. (4) Rescue capabilities of the network are severely curtailed during most events, and are dependent primarily on air and water movements immediately thereafter. (5) Earthquakes are the most severe of all the emergencies studied, both in terms of physical damage and disruption of flow. No element was found to be immune to this emergency. (6) Following closely behind earthquakes in terms of physical damage and functional disruption are floods and hurricanes. (7) Of least significance to the transportation network are tornadoes and fires, presumably because of their extremely localized occurrence and the inherent immunity of most elements of the network to them. (8) Mechanical failures also have relatively insignificant effects upon the transportation system.
PB-173 600 HC$3.00 MF$0.65

CHILDREN'S CLOTHING IN ITALY.
Trancu (Theodore C.) and Associates, Milan (Italy).
For primary bibliographic entry see Field 5C.
PB-174 786 HC$3.00 MF$0.65

15F. NUCLEAR WARFARE

THE DEVELOPMENT OF A WATER-SURFACE BURST FALLOUT MODEL: THE RISE AND EXPANSION OF THE ATOMIC CLOUD,
Naval Radiological Defense Lab., San Francisco, Calif.
I. O. Huebsch. 23 Apr 64, 102p USNRDL-TR-741

Descriptors: (*Radioactive fallout, Atmosphere models), (*Atomic clouds, Atmosphere models), (*Sea water, Radioactive fallout), Nuclear bombs, Air mass analysis, Mathematical models, Equations, Tables, Turbulence, Temperature, Computer programs.

The report gives a detailed discussion of cloud rise, particle formation, and particle fall through the atmosphere. The cloud rise is described by a set of equations which specify: cloud height, size, temperature, water content, etc., as functions of time and of initial and atmospheric conditions. The equations have been programmed for machine computation and the numerical results are in general agreement with weapon-test observations of atomic clouds.
AD-441 983 HC$3.00

15G. OPERATIONS, STRATEGY, AND TACTICS

COUNTERINSURGENCY BIBLIOGRAPHY - SUPPLEMENT NO. 7,
Research memo.,
American Univ., Washington, D. C. Special Oper-

stions Research Office.
Margaret Mughisuddin. Jun 65, 123p RM-65-7

Descriptors: (*Counterinsurgency, *Bibliographies), Guerrilla warfare, Military intelligence, Psychological warfare, Sociology, Defense systems, Political science, Economics, Casualties, History, Latin America, Europe, Asia, Middle East, Southeast Asia, Vietnam, Logistics, Military training.

Contents: Areas of instability; The nature of insurgency; Communist support and exploitation; Political posture; Military strategy; Recruitment and training, command and leadership, troop morale and discipline; Working with indigenous forces; Logistics; Intelligence and counterintelligence; General socio-economic-political measures; Psychological operations; Resettlement; Intimidation, repression, terrorism, and police actions; Antiguerrilla warfare; Legality and morality; and Historical models of counterinsurgency.
AD-468 851 HC$3.00 MF$0.65

EFFECTS OF A SHOCK WAVE ON A PETER SNOW ARCH.
Preliminary rept.,
Snow Ice and Permafrost Research Establishment Wilmette Ill
John E. McCoy, and Robert W. Waterhouse. Jul 60, 8p Rept no. SIPRE-SR-39

Descriptors: (*Shock waves, *Snow), (*Explosion effects, *Military tactics), Deposition, Shear stresses, Temperature, Demolition, Electronic equipment, Measurement, Army.

The U. S. Army Snow Ice and Permafrost Research Establishment (USA SIPRE) was requested by the Office, Chief of Engineers to conduct a small-scale test to evaluate the resistance of a rigid snow trench cover to the blast effects of a military explosive. The USA SIPRE field crew conducting research on snow structures at Camp Century, 138 miles inland from Camp Tuto, Greenland, was requested to prepare the test setup. U. S. Army Engineer Waterways Experiment Station (USA WES) was requested to measure the magnitude of the pressure wave during the test. The objective of the test was to obtain preliminary information which would be used to estimate the probable effect of large-scale explosions on a snow arch roof. (Author)
AD-653 147 HC$3.00 MF$0.65

16. MISSILE TECHNOLOGY

16A. MISSILE LAUNCHING AND GROUND SUPPORT

GROUNDING OF ROCKET EXPERIMENTS.
National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
For primary bibliographic entry see Field 22D.
For abstract, see STAR 05 14.
N67-26591 HC$3.00 MF$0.65

16B. MISSILE TRAJECTORIES

POSITION FROM ANGLE MEASUREMENT.
Special rept.,
Army Test and Evaluation Command White Sands Missile Range N Mex Deputy for National Range Engineering
P. J. Short. Jul 66, 43p Rept no. RE-S-66-3

Descriptors: (*Position finding, Least squares method), (*Guided missiles, *Tracking), Equations, Errors, Space navigation, Geometry.

The position of an object in space is estimated from a set of angular measurements and certain axiomatic equations. The bases for the method are the Principle of Least Squares and Euclidean spatial geometry. (Author)
AD-653 152 HC$3.00 MF$0.65

17. NAVIGATION, COMMUNICATIONS, DETECTION, AND COUNTERMEASURES

17A. ACOUSTIC DETECTION

EXPERIMENTAL INVESTIGATIONS OF MAN-MACHINE PROCESSING OF INFORMATION, VOLUME I.
Rept. for Aug 64-Jun 66.
General Dynamics Corp Groton Conn Electric Boat Div
Herbert M. Kaufman, Robert M. Levy, Tayler L. Booth, Robert M. Glorioso, and James R. Walter. 28 Nov 66, 169p Rept no. U417-66-037-Vol-I
Contract Nonr-2512 (00)
Prepared in cooperation with Connecticut Univ., Storrs. Rept. on Proj. SUBIC.

Descriptors: (*Detection, *Man-machine systems), (*Sonar, Detection), Performance (Human), Computers, Display systems, Operators (Personnel), Signal-to-noise ratio, Decision making, Data processing systems.
Identifiers: SUBIC.

An experimental program to determine the capabilities of a man-computer system in processing target-in-noise displays is described. A general detection model, based on digital processing and a time varying operator display of the type found in sonar systems, is discussed. The theoretical effects of a number of detection model parameters are analyzed and their implications for the human operator explored. An experimental study of human operator processing of simulated Time-Bearing data under varying signal to noise ratios (S/N) and clipping thresholds (T) are described. Results indicate that human operators can maintain a consistently high detection performance level over the range of S/N and T studied. Performance, as measured by the number of trials to reach a decision, follows the theoretical optimum predicted by analytical studies. (Author)
AD-653 278 HC$3.00 MF$0.65

A MEASUREMENT OF OCEAN-BOTTOM SLOPE.
Navy Underwater Sound Lab New London Conn
For primary bibliographic entry see Field 8J.
AD-653 286 HC$3.00 MF$0.65

17B. COMMUNICATIONS

SOME EFFECTS OF ANESTHETIZING THE ARTICULATORS UNDER CONDITIONS OF NORMAL AND DELAYED SIDE-TONE,
Naval School of Aviation Medicine, Pensacola, Fla.
Robert L. McCroskey, Jr. 1956, 15p NSAM-65 NAVMED-NM-001-104-500

Descriptors: (*Speech, Intelligibility), Voice communication systems, Psychoacoustics, Otorhinolaryngology, Speech recognition, Accuracy, Anesthesia, Noise.

Six speakers recorded three forms of the multiple-choice intelligibility tests under four conditions of side-tone: (1) normal, (2) delayed airborne side-tone (0.18 second), (3) disrupted tactile feedback (articulators anesthetized), and (4) delayed side-tone plus the loss of specified tactile cues. Criterion measures of duration, correctly articulated words, and correct word perception were obtained from 900 subjects. Analysis of the duration and of correctly articulated words indicated significant differences among conditions. A secondary effect on intelligibility is indicated by significant differences among the four conditions in quiet, but not in noise. (Author)
AD-119 605 HC$3.00

AN ULTRASTABLE MICROWAVE RADIOMETER.
Instrumentation papers no. 49,
Air Force Cambridge Research Labs., L. G. Hanscom Field, Mass.
William B. Goggins, Jr. Sep 64, 29p AFCRL-64-736

Descriptors: (*Microwave equipment, Radiometers), Amplifiers, Signal-to-noise ratio, Calibration, Feedback, Servomotors, Gain, Errors, Noise (Radio), Temperature, Sensitivity.

Feedback applied to a radiometer will stabilize its gain when the radiometer receiver is in the forward part of a Type 1 servo. A prototype system has proved stable even under adverse test conditions. The rms noise fluctuation is the same as that of a Dicke radiometer. (Author)
AD-449 487 HC$3.00

SPEAKING AND LISTENING THROUGH THE HEAD: II. THE INTELLIGIBILITY OF SPEECH RECORDED IN NOISE.
Research paper,
Defence Research Medical Labs Toronto (Ontario)
R. A. Strong, V. G. Chant, S. E. Forshaw, and Keith K. Neely. 1966, 7p Rept no. DRML-RP-636
Availability: Published in The Journal of Auditory Research v6 p385-91 1966.

Descriptors: (*Speech transmission, Transducers), (*Speech, Intelligibility), Bone, Conductivity, Noise, Pressure, Analysis of variance, Canada.

In environments where ambient noise level does not exceed 120 db, bone-conduction (bc) transducers can be used to transmit speech. A high-sensitivity bc transducer was found comparable to a standard noise-cancelling ac transducer in picking up speech in environments where the level of noise was either 110 or 120 db. Experimental prototype bc transducers, when used on the upper lip, were found to be significantly more effective in picking up intelligible speech than a commercially available high-sensitivity transducer. (Author)
AD-652 758 Not available from CFSTI.

DETECTION OF A SIGNAL WITH AN UNKNOWN PARAMETER.
Technical rept.,
Bell Telephone Labs Inc Whippany N J
Ira Jacobs. 17 Aug 66, 12p Rept no. TR-12
Contract N00014-66-C-0005
Prepared in cooperation with Western Electric Co., New York, N. Y.

Descriptors: (*Signals, Detection), Signal-to-noise ratio, Statistical tests, Probability density functions, Theory, Noise.

Preliminary consideration is given to the general problem of the detection of a signal that depends on an unknown parameter. Two detection procedures are contrasted: (1) a likelihood ratio detector plus maximum likelihood estimator, and (2) a combined maximum likelihood detector and estimator. The latter has the apparent advantage of not requiring a priori knowledge of the distribution of the parameter, but this oft-stated advantage is shown to be misleading. Special cases considered indicate that the former procedure, which has a firmer theoretical basis, becomes relatively insensitive to a priori knowledge when sufficient data are present. (Author)
AD-652 808 HC$3.00 MF$0.65

A DELAYED COMMAND SYSTEM FOR A NEAR-EARTH SATELLITE.
Johns Hopkins Univ Silver Spring Md Applied Physics Lab
For primary bibliographic entry see Field 22C.
AD-652 816 HC$3.00 MF$0.65

ANALYSIS OF COMMUNICATION SCHEMES USING AN INTERMITTENT FEEDBACK LINK.
Technical rept.,
Stanford Univ Calif Stanford Electronics Labs
Anthony J. Kramer. Mar 67 , 98p Rept no. TR-7050-11, SEL-67-014
Contract Nonr-225 (83)

Descriptors: (*Communication systems, Feedback), Analysis, Systems engineering, Errors, Probability, Optimization, Signals, Data transmission systems, Radiofrequency interference, Gain.

Given any set of signals for use with a one-way communication channel, a feedback channel can be used to decrease the average power used by the transmitter while keeping the error probability the same, or equivalently, decreasing the error probability for the same average transmitter power. The case of orthogonal transmitter signals is analyzed in detail. The feedback channel is used only to tell the transmitter at certain specified times (prior to a final decision) which signal the receiver believes is being sent. The feedback information is used by the transmitter to modify its transmission according to a rule known also at the receiver. The feedback communication scheme is analyzed for both a noiseless and a noisy feedback link. In the case of noiseless feedback if only an average transmitter power constraint is imposed and orthogonal signals are used, it is possible to have the error probability go down in an N-fold exponential manner with increasing signal duration, where N-1 corresponds to the number of feedback iterations per message. This is in contrast to only a double exponential form for the error probability with some previously proposed feedback schemes. If a peak transmitter power constraint is also imposed, neither the N-fold exponential nor the double exponential behavior can be obtained. The peak power constraint limits the error probability expression to only a single-exponential form. (Author)
AD-652 825 HC$3.00 MF$0.65

THE MATHEMATICAL THEORY OF A STATIONARY QUEUE,
Rand Corp Santa Monica Calif
For primary bibliographic entry see Field 12A.
AD-652 833 HC$3.00 MF$0.65

USE OF FLUORESCENT MATERIALS AND ULTRAVIOLET LIGHTING TO CONTROL VISUAL SIMULATION MODEL LIGHTING FOR TELEVISION IMAGE PICKUP.
Technical rept.,
Systems Engineering Group Wright-Patterson AFB Ohio
Richard J. Heintzman. Feb 67, 23p Rept no. SEG-TR-66-66

Descriptors: (*Television display systems, *Images), Fluorescent screens, Terrain, Color television, Ultraviolet equipment, Models (Simulations), Viewing screens, Cameras, Test equipment (Electronics), Colors.

Lighting the models used in visual simulation often entails many problems. For a monochrome television system of image display, proper contrast depends upon lighting the model, the color hues of the model, the reflectance and shading, and the spectral response of the television camera. In the test reported, an attempt was made to control image contrasts by controlling the spectral range of the reflected image through use of fluorescent coatings and ultraviolet light. Also, filters were used for controlling extraneous reflections. The efficiency of conventional lighting and reflecting material is compared with that of ultraviolet lighting and fluorescent material. Fluorescence for simulation models offers the greatest advantages for applications that have a limited area of interest, such as in vehicle simulation; there is little advantage when applied to large areas, such as those of terrain models. (Author)
AD-652 838 HC$3.00 MF$0.65

FLEXIBLE-MEMBRANE FABRY-PEROT INTERFEROMETER,
Massachusetts Inst of Tech Cambridge Research Lab of Electronics
For primary bibliographic entry see Field 14B.
AD-652 895 Not available from CFSTI.

PICTURE CODING.
Revised ed.,
Massachusetts Inst of Tech Cambridge Research Lab of Electronics
W. F. Schreiber. 13 Jan 67, 12p
Contract DA-36-039-AMC-03200 (E), Grant NsG-496
Revision of manuscript submitted 30 Nov 66.
Availability: Published in Proceedings of the IEEE v55 n3 p320-30 Mar 1967.

Descriptors: (*Pictures, *Coding), (*Pulse code modulation, Visual perception), (*Visual perception, Communication systems), Images, Data transmission systems, Television communication systems, Facsimile communication systems, Information theory, Simulation, Visual acuity, Psychophysiology.
Identifiers: Image transmission systems, Differential pulse code modulation.

A critical view is presented of the development of certain picture coding systems. An attempt is made to unify the treatment of these systems by emphasizing the reaction of the observer to the types of alteration introduced into the transmitted signal, on the basis of what is known about vision. For the purpose of casting a number of apparently different techniques into similar forms, the relationship between differential quantizing and PCM is discussed in detail. It is concluded that the pre- and post-quantizing filters play a key role in these systems. Optimum choice of such filters is shown to improve both quality and efficiency. Two-dimensional and dual-mode systems are seen to be outgrowths of these considerations. Recent results are described and a method of comparison between systems is proposed. (Author)
AD-652 906 Not available from CFSTI.

DESIGN CONSIDERATIONS IN PCM TRANSMISSION OF LOW-RESOLUTION MONOCHROME STILL PICTURES.
Revised ed.,
Massachusetts Inst of Tech Cambridge Research Lab of Electronics
Thomas S. Huang, Oleh J. Tretiak, Birendra Prasada, and Y. Yamaguchi. 13 Jan 67, 5p
Contract DA-28-043-AMC-02536 (E), Grant NsG-496
Revision of manuscript submitted 28 Dec 66. Prepared in cooperation with Indian Inst. of Tech., Kanpur (India), and Japan Broadcasting Corp., Tokyo.
Availability: Published in Proceedings of the IEEE v55 n3 p331-5 Mar 1967.

Descriptors: (*Facsimile transmission, *Pulse code modulation), Scanning, Brightness, Sampling, Signal-to-noise ratio, Optimization.

The effects of changes in system parameters on the picture quality in PCM transmission systems are presented. The report restricts its attention to low-resolution monochrome still pictures, and discusses in particular the effects of the number of samples per frame, the number of brightness levels, the scanning pattern, and the channel noise, with a view to the optimal choice of these parameters. (Author)
AD-652 908 Not available from CFSTI.

INTRODUCTION TO EXTENDED, TIME-SHARED PROCESSOR SYSTEMS.
Army Electronics Command Fort Monmouth NJ
For primary bibliographic entry see Field 9B.
AD-653 142 HC$3.00 MF$0.65

WIDEBAND DIGITAL MODULATION AND DETECTION TECHNIQUES FOR TROPOSCATTER.
Quarterly rept. no. 3, 1 Jan-31 Mar 67,
Communication Systems Inc Paramus N J
E. Levine, R. T. Adams, and P. Grobert. May 67, 44p Rept no. CSI-67-TR-2380
ECOM-02542-3
Contract DA-28-043-AMC-02542 (E)
See also AD-648 952.

Descriptors: (*Data transmission systems, *Multipath transmission), Modulation, Digital systems, Transmitter-receivers, Reliability (Electronics), Costs, Signal-to-noise ratio, Demodulators, Modulators.

The program objective is to identify and breadboard the modulation technique offering best performance for transmission of high digital data rates over tactical troposcatter paths of 50 to 150 miles at 5 ghz. The study is concerned with higher order modulation coding, in-band diversity and other techniques that may bring about an optimal match to the medium. The prime traffic rates under consideration are 0.576 and 1.15 megabits per second. During this quarter, a specific near-optimum modulation technique was chosen for implementation, and the necessary circuits for transmitter and receiver were planned and analyzed in detail. A tentative set of circuit block diagrams was completed. This circuit was then refined and it was found possible to simplify parts of the receiver circuitry by modifying the specific detection process used. With the first-choice modulation pattern fully analyzed, and the required circuits outlined in detail, it became possible to consider trade-offs of cost, complexity, probable reliability and size factors, and overall performance as a function of simplification and modification in the choice of pattern. A particularly attractive simplified choice of modulation pattern results in about two to one reduction in circuit cost and complexity, and appears to have theoretical advantages in links having a wide correlation bandwidth, allowing wider frequency spacing for in-band diversity. (Author)
AD-653 159 HC$3.00 MF$0.65

ATMOSPHERIC RADIO NOISE DATA, BANKOK, THAILAND - SEPTEMBER-NOVEMBER 1966.
Geophysical data rept.,
Stanford Research Inst Menlo Park Calif
Rangsit Chindahporn, Prajuab Nimityongskul, and Chaikamol Lumjiak. Mar 67, 20p
Contract DA-36-039-AMC-00040 (E), ARPA Order-371

Descriptors: (*Atmospherics, *Noise (Radio)), (*Radio interference, Measurement), Antennas, Very low frequency, Low frequency, Medium frequency, High frequency, Nomographs, Thailand.
Identifiers: ARN-2, ARN-3.

Measurements were made of atmospheric radio noise at a joint Thailand-United States-organization in Bangkkok. The noise-measuring equipment, modeled after the U. S. National Bureau of Standards Radio Noise Recorder, Model ARN-2, is located near the village of Laem Chabang, about 90 kilometers southeast of Bangkok, in

order to minimize interference from man-made noise. A view of the site, showing the standard ARN-2 antenna and ground plane, is presented. For convenience in applying the results in this study, a nomogram for transforming effective antenna noise figure to noise field strength as a function of frequency is presented.
AD-653 164 HC$3.00 MF$0.65

SPEECH RESEARCH.
Status rept., 1 Jul-31 Dec 66,
Haskins Labs New York
Franklin S. Cooper. Mar 67, 98p Rept no. SR-7/8 (1966)
Contract N00014-67-A-0129-0001, Grant PHS-HD-01994

Descriptors: (*Speech, Reports), Perception (Psychology), Synthesis, Electromyography, Instrumentation, Speech recognition, Hearing, Deafness, Phonetics, English language, Intelligibility, Psychoacoustics, Otorhinolaryngology, Auditory perception.

Extended reports and manuscripts cover the following topics: Hemispheric Specialization and the Perception of Speech. An Electromyographic Study of Articulatory Dynamics in Hearing-Impaired and Normal Speakers. The Identification and Discrimination of Synthetic Nasals. Synthesis by Rule of General American English. Measuring Stop Closure Duration from Intraoral Pressure Records. A Study of Voicing in the Stops Found in the Pre-Linguistic Babblings of Infants. Experiments on the Perception of Mandarin Vowels and Tones. Interim reports on the following topics are also included: The Scaling of Speech Sounds. Perception of Second-Formant Transitions in Non-Speech Patterns. (Author)
AD-653 373 HC$3.00 MF$0.65

INSTRUMENTATION FOR MEASUREMENT OF COSMIC NOISE AT 750, 1225, AND 2000 K HZ FROM A ROCKET FINAL TECHNICAL REPORT.
Michigan Univ., Ann Arbor. Dept. of Electrical Engineering.
For primary bibliographic entry see Field 3A.
For abstract, see STAR 05 14.
N67-26513 HC$3.00 MF$0.65

COMMUNICATIONS SATELLITES.
National Aeronautics and Space Administration, Washington, D. C.
For primary bibliographic entry see Field 22B.
For abstract, see STAR 05 14.
N67-26600 HC$3.00 MF$0.65

NEW COATING PROCESS FOR FOAMED POLYETHYLENE INSULATED TELEPHONE CABLE.
Sumitoto Electric Industries, Ltd., Yokohama (Japan).
T. Ichiba, C. Kawazoe, H. Shinba, M. Sugi, and T. Suzuki. Dec 67, 6p AD-646542
Presented At the 15th Ann. Wire and Cable Symp., Atlantic City, 7-9 Dec. 1966

Descriptors: *Electric insulation, *Manufacturing, *Plastic coating, *Telephone, *Transmission line, Coating, Communication, Conductor, Conference, Development, Electric, Exchange, Expansion, Fine, Foam, Gauge, High density, High speed, Insulation, Line, Machine, Method, Plastic, Polyethylene, Process, Protection, System, Transmission, Wire.

For abstract, see STAR 05 14.
N67-26784 HC$3.00 MF$0.65

APPLICATION OF WELDED THIN METAL IN NEW COMMUNICATION CABLE DESIGNS.
Canada Wire and Cable Co., Ltd., Toronto (Ontario).
For primary bibliographic entry see Field 9A.
For abstract, see STAR 05 14.
N67-26788 HC$3.00 MF$0.65

PROTECTION OF TELEPHONE CABLES FROM ATTACK BY INSECTS.
Postmaster-generals Dept., Melbourne (Australia).
G. Flatau. 1966, 19p AD-646543
Presented At the 15th Ann. Wire and Cable Symp., Atlantic City, 7-9 Dec. 1966

Descriptors: *Insect, *Protective coating, *Telephone, *Transmission line, Acetate, Aluminum, Attack, Barrier, Cellulose, Coating, Copper, Electric, Lead, Line, Metal, Nylon, Plastic, Polyester, Protection, Resistance, Rubber, Sheath, Transmission.

For abstract, see STAR 05 14.
N67-26807 HC$3.00 MF$0.65

RESEARCH LABORATORY OF ELECTRONICS QUARTERLY PROGRESS REPORT, PERIOD ENDING 28 FEB. 1967.
Massachusetts Inst. of Tech., Cambridge. Research Lab. of Electronics.
For primary bibliographic entry see Field 9C.
For abstract, see STAR 05 14.
N67-27081 HC$3.00 MF$0.65

EXTERNAL NOISE AND ANTENNA NOISE TEMPERATURES IN THE 136 AND 400- M HZ SATELLITE FREQUENCY HANDS.
Externe Stoerungen Und Antennenrauschtemperatur- Turen Bei Satellitenbeobachtungen Im 136 Und 400-mhz-bereich
Deutsche Versuchsanstalt Fur Luft- Und Raumfahrt, Oberpfaffenhofen (West Germany). Institut Fuer Flugfunk Und Mikrowellen.
S. Starker. Feb 67, 51p DLR-FB-67-12, DVL-576
in German, English Summary Presented At the Symposium "systemfragen Fuer Bodenstationen", Darmstadt, West Germany, 7-8 Oct. 1965

Descriptors: *Microwave antenna, *Radio noise, *Satellite communication, *Thermal noise, Antenna, Band, Bibliography, Calculation, Communication, Earth, Equation, Frequency, Galaxy, Ionosphere, Microwave, Moon, Noise, Planet, Radiation, Radio, Satellite, Star, Sun, Temperature, Thermal, Troposphere.

For abstract, see STAR 05 14.
N67-27260 HC$3.00 MF$0.65

A SPACE COMMUNICATION STUDY PROGRESS REPORT, 15 SEP. 1966 - 15 MAR. 1967.
Polytechnic Inst. of Brooklyn, N. Y. Dept. of Electrical Engineering.
K. K. Clarke, R. L. Pickholtz, and D. L. Schilling. Mar 67, 46p NASA-CR-84452
Contract NGR-33-006-020

Descriptors: *Optimization, *Signal transmission, *Space communication, Channel, Communication, Detection, Electronics, Extension, Noise, Reception, Signal, Simulation, Space, Study, Synchronization, Technique, Threshold, Transmission.

For abstract, see STAR 05 14.
N67-27635 HC$3.00 MF$0.65

AN AUTOMATIC SYSTEM FOR THE ANALYSIS OF TIME VARIANT DATA.
Institute for Telecommunication Sciences and Aeronomy. Boulder, Colo.
For primary bibliographic entry see Field 9C.
PB-173 593 HC$3.00 MF$0.65

MULTIPLE ACCESS RELAYING FOR A SYNCHRONOUS OPERATIONAL METEOROLOGICAL SATELLITE.
Telcom, Inc., Arlington, Va.
For primary bibliographic entry see Field 22B.
PB-173 764 HC$3.00 MF$0.65

17C. DIRECTION FINDING

A METHOD FOR DETERMINING THE LOCATION OF DEEP-OCEAN ACOUSTIC SOURCES,
Naval Research Lab., Washington, D. C.
For primary bibliographic entry see Field 17G.
AD-643 531 HC$3.00 MF$0.65

17E. INFRARED AND ULTRAVIOLET DETECTION

RESULTS OF THE FIRST INFRARED ASTRONOMICAL ROCKET FLIGHT,
Cornell Univ Ithaca N Y Center for Radiophysics and Space Research
Martin Harwit, D. P. McNutt, K. Shivanandan, and B. J. Zajac. 1966, 4p
Grant NSF-GP-1998
Research supported in part by ONR. Prepared in cooperation with Naval Research Lab., Washington, D. C.
Availability: Published in Astronomical Journal v71 n10 p1026-9 Dec 1966.

Descriptors: (*Infrared telescopes, Astronomical data), (*Rocket research, *Infrared detectors), Infrared radiation, Infrared research, Infrared photoconductors, Scientific research, Astrophysics, Stars, Galaxies.

A 5.5-in.-diameter f/0.8 telescope was flown in an Aerobee rocket. Detectors sensitive in the 1 to 3 micron and the 3 to 7 micron region scanned the sky as the rocket rolled and tumbled. The scanning rate was too fast and erratic to definitely identify any discrete sources. Upper limits can, however, be placed on the infrared night-sky radiation density. They are approximately equals 2 x 10 to the -12 power erg/cc or approximately equals 10 to the -9 power W/cm2 sr for the 1 to 3 micron region and approximately equals 2 x 10 to the -11 power erg/cc or approximately equals 10 to the -8 power W/cm2 sr for the 3 to 7 micron region. These values are three to five orders of magnitude more precise than previous upper limits based on observations made through the atmosphere. (Author)
D-652 722 Not available from CFSTI.

InSb MOS INFRARED DETECTOR,
Massachusetts Inst of Tech Lexington Lincoln Lab
R. J. Phelan, Jr., and J. O. Dimmock. 5 Dec 66, 5p Rept no. JA-2946
ESD-TR-67-262
Contract AF 19 (628)-5167
Availability: Published in Applied Physics Letters v10 n2 p55-7 Jan 15 1967.

Descriptors: (*Infrared detectors, *Inuium antimonides), (*Semiconductor devices, Infrared detectors), Photoelectric effect, Carriers (Semiconductors), Metal films, Nickel, Oxides, Infrared radiation.
Identifiers: Metal-oxide semiconductors.

Infrared photovoltaic response and high quantum efficiency were observed in a large-area InSb, metal-oxide semiconductor structure. Spectral measurements indicate that the response is due to the generation of electron-hole pairs in a depletion region of the n-type InSb at the InSb-oxide interface. Pulsed current measurements yield a clear diode characteristic and the overall results are equivalent to what one would expect to obtain

from a photodiode in series with a MOS capacitor. (Author)
AD-653 365 Not available from CFSTI.

17G. NAVIGATION AND GUIDANCE

A METHOD FOR DETERMINING THE LOCATION OF DEEP-OCEAN ACOUSTIC SOURCES,
Naval Research Lab., Washington, D. C.
J. J. Gennari, and F. W. Heemstra. 1 May 66, 22p
NRL-6407

Descriptors: (*Underwater navigation, Position finding), (*Position finding, Sound signals), Deep submergence, Submarines, Underwater sound equipment, Navigational aids, Sources, Acoustics, Depth finding.

A concept and method were developed by which a vehicle can determine the location and acoustic source level of deeply submerged acoustic projectors. This concept was tested by using an acoustic source whose location and output level were known. A distribution of such known sources would provide a navigation system. The method for locating the position of an unknown source is essentially the solution of triangulation equations by use of the time difference in the arrivals of the direct and surface reflected acoustic pulses. Usually three measurement stations are to be chosen in a triangular pattern with distances between the stations of at least 5 miles. An application of this method is feasible in concept as a passive ranging system in certain types of ASW situations. (Author)
AD-643 531 HC$3.00 MF$0.65

SPACE REFERENCE SYSTEMS.
Technical rept.,
Aeronautical Chart and Information Center, St. Louis, Mo.
William T. Riordan. Apr 66, 66p ACIC-TR-98

Descriptors: (*Space navigation, *Celestial mechanics), Orbital trajectories, Geometry, Transformations (Mathematics).
Identifiers: Space reference systems.

The various space reference systems, applicable to the specification of positions and motions of objects in the solar system, are discussed according to their origin. Geocentric, topocentric, selenocentric, heliocentric, planetocentric, barycentric, orbit plane, vehicle-centered, galactic and geomagnetic systems are included. The various fundamental planes and principal directions used with each system are described. Where possible, the uses of the system are indicated. The transformations relating one system to another and the errors inherent both in the specifications of the positions and in the carrying out of the transformations are examined in detail. (Author)
AD-644 222 HC$3.00 MF$0.65

SOME FACTORS AFFECTING THE CORRECTION OF IONOSPHERIC REFRACTION ERRORS IN TRANSIT DOPPLER DATA.
Technical rept.,
Texas Univ Austin Defense Research Lab
Julian R. Wright. 28 Nov 61, 13p Rept no. DRL-473
Contract NOrd-16498
Prepared in cooperation with Johns Hopkins Univ., Silver Spring, Md. Applied Physics Lab. CF-2959.

Descriptors: (*Doppler navigation, Doppler systems), (*Navigation satellites, Doppler navigation), Corrections, Errors, Refraction, Ionospheric propagation, Phase.
Identifiers: TRANSIT.

It is present practice to eliminate 'first order' refraction effects from TRANSIT doppler data by using the doppler shifts at two frequencies. If an effort is made to correct higher order refraction errors by using doppler shifts at three or four frequencies, the effect of errors other than those caused by refraction is increased. It is shown that these other errors must be decreased before higher order refraction correction is useful. It is further pointed out that the erratic errors which constitute a bar to further refraction correction are useful as a measure of other types of system error. Reduction of these erratic errors constitutes a simple criterion of improved system performance. (Author)
AD-652 804 HC$3.00 MF$0.65

NAVIGATION SYSTEMS FOR AIRCRAFT AND SPACE VEHICLES,
Advisory Group for Aeronautical Research and Development Paris (France)
T. G. Thorne. 1962, 551p Rept no. AGARD-ograph-55
N62-16398
Papers presented at the AGARD Avionics Panel Meeting, 3-8 Oct 60, Istanbul (Turkey).
Availability: Available from Pergamon Press, 122 E. 55th St., New York, $17.64.

Descriptors: (*Space navigation, Symposia), (*Navigation, *Aircraft), Navigational aids, Air traffic control systems, Instrument landings, Control systems, Radio navigation, Radio transmission, Doppler navigation, Approach, Aircraft landings, Tracking, Geodesics.

Topics covered include navigation aids for aircraft, air traffic control, automatic landing and navigation and control of space vehicles.
AD-652 919 Not available from CFSTI.

LOW COST CAPTURE EFFECT GLIDE SLOPE AMPLITUDE AND PHASE CONTROL UNIT.
Final rept.,
Micro-Radionics Inc Van Nuys Calif
Jack Catran, and Michael A. Midwin. 10 Aug 66, 30p
FAA-RD-66-58
Contract FA-65-WA-1213

Descriptors: (*Glide path systems, *Design), Antennas, Phase control devices, Signals, Accuracy, Strip transmission lines, Antenna components, Laminates, Costs, Performance (Engineering), Tests.

The primary objective of the program was to design, develop, and manufacture, within the requirements of the specification, an equipment which would: operate in the 328 mc to 336 mc glide slope band; accept, combine, and mix signals from three different sources into the appropriate phase and amplitude relationship; and deliver the signals to three FAA supplied glide slope transmitting antennas. Full use was made of the Micro-Radionics AIR-STRIP technique. The tasks, activities, conclusions, and recommendations are sequentially presented for the entire life of the program, from award of contract through qualification and acceptance. A value and performance analysis of low-cost copper-clad base laminates was conducted, which resulted in an extensive investigation of all known materials. A special RF connector was used, to save the cost of modifying the UC-58A/U Type N connectors which required the installation of connecting links and pins. Simplicity and low cost were emphasized in the design of the RF probe coupler, and the crystal detector was located on the external surface of the package to provide maximum accessibility during crystal replacement. The hybrids used for the power divider were located so that the phase shifters could be mounted logically and the length of all transmission lines were kept to a minimum to reduce phase error. The development of the principal subsystems are discussed in detail. Because the equipment has the inherent performance capabilities required to successfully meet the specified criteria, it is recommended that no changes be made. (Author)
AD-652 939 HC$3.00 MF$0.65

DESIGN STUDY REPORT. EXPERIMENTAL EVALUATION OF PWI/CAS INTERROGATOR-TRANSPONDER TECHNIQUES. VOLUME I,
Sperry Gyroscope Co Great Neck N Y
For primary bibliographic entry see Field 1B.
AD-652 943 HC$3.00 MF$0.65

DESIGN STUDY REPORT. EXPERIMENTAL EVALUATION OF PWI/CAS INTERROGATOR-TRANSPONDER TECHNIQUES. VOLUME II,
Sperry Gyroscope Co Great Neck N Y
For primary bibliographic entry see Field 1B.
AD-652 944 HC$3.00 MF$0.65

HARBOR SURVEY ASSISTANCE PROGRAM CONDUCTED BY NAVOCEANO IN THE VICINITY OF PUERTO BARRIOS, GUATEMALA.
Informal rept.,
Naval Oceanographic Office Washington D C
G. Tselepis, and D. J. Ouellette. Apr 67, 31p
Rept no. N00-IR-67-22

Descriptors: (*Harbors, *Navigation), (*Hydrographic surveying, *Naval training), Mapping, Guatemala, Surveying, Ocean currents, Geodesics.
Identifiers: Harbor Survey Assistance Program.

The Harbor Survey Assistance Program (HARSAP) is intended to provide a hydrographic mission to train personnel of, advise, and assist other governments in conducting hydrographic surveys of harbors and their approaches. It should be noted that the Naval Oceanographic Office does not conduct these surveys; the host nation in each case directs the operation, and our function is simply one of providing the assistance of experienced personnel and a limited amount of associated equipment. The results to date have been most gratifying, and it is anticipated that two of these programs will be conducted annually for several more years. (Author)
AD-653 085 HC$3.00 MF$0.65

POSITION FROM ANGLE MEASUREMENT.
Army Test and Evaluation Command White Sands Missile Range N Mex Deputy for National Range Engineering
For primary bibliographic entry see Field 16B.
AD-653 152 HC$3.00 MF$0.65

AIRBORNE OMEGA RECEIVER.
Interim rept. no. 2,
Naval Research Lab Washington D C
A. F. Thornhill. 29 Feb 60, 23p Rept no. NRL-MR-1029
See also AD-481 365.

Descriptors: (*Radio receivers, *Hyperbolic navigation), Airborne, Very low frequency, Aircraft equipment, Phase measurement, Accuracy.

It is desired that techniques for the Omega navigation system be developed to permit its use in aircraft. Omega utilizes a hyperbolic grid of isophase lines established by VLF transmitters. It is characterized by very long range capability and potentially high accuracy. (Author)
AD-653 292 HC$3.00 MF$0.65

INTERFERENCE PREDICTIONS FOR VHF/UHF AIR NAVIGATION AIDS.
Technical rept.,
Institutes for Environmental Research, Boulder, Colo.
G. D. Gierhart, and M. E. Johnson. Mar 67, 137p
ITSA-26
IER-26
Supported by Contract FA-64-WAI-69.

Descriptors: (*Radio navigation, Radio equipment), (*Navigational aids, Compatibility), Predictions, Very high frequency, Ultrahigh frequency, Radio transmission, Antenna radiation patterns, Gain, Graphics.

Desired-to-undesired signal ratio predictions for the VHF Omnirange (VOR), Tactical Air Navigation (TACAN) and Instrument Landing Systems (ILS) air navigation aids are presented. The parameters involved in the various systems are given first. Next propagation mechanisms applicable to the VHF and UHF bands are discussed together with the calculation of transmission loss and its variability. Third, the statistical nature of the desired-to-undesired signal ratio predictions is explained. Finally, the results of the study are presented in graphical form. Aircraft altitudes from 500 to 100,000 feet along with station separations from 20 to 695 nautical miles are considered. Detailed procedures, mathematical formulas, and computer programs used are discussed. (Author)
PB-174 828 HC$3.00 MF$0.65

17H. OPTICAL DETECTION

A REAL TIME FOURIER TRANSFORM SYNTHESIZER,
Utah State Univ Logan Electro-Dynamics Labs
Joseph E. Hoffman, Jr. 1 Nov 66, 132p Rept no. Scientific-7
AFCRL-67-0049
Contract AF 19 (628)-3825, ARPA Order-450

Descriptors: (*Interferometers, *Real time), (*Optical scanning, *Integral transforms), Refractive index, Spectrum analyzers, Spectroscopy, Transformations (Mathematics), Synthesis, Optical instruments, Digital computers, Errors, Gain, Performance (Engineering), Electrical networks, Frequency multipliers, Detectors.

A study of the relationship between the interferogram F (x) obtained in Fourier spectroscopy and the corresponding spectral distribution E is made. It is found that the spectral distribution is the Fourier cosine transform of the interferogram. Various computational techniques for performing the required transformation are studied, and a real time Four r transform synthesizer is described. It has been designed to be compatible with a lamellar grating Michelson interferometer, but could be used just as well with a well-compensated Michelson interferometer. The system used to obtain the point of zero path difference is described in detail. A novel approach is used to obtain the cosine functions required in the synthesis of the cosine transform. All the computations except the summation are done in analog form, while the summation is done digitally. The result of the computation, the spectral distribution, is available as soon as the interferogram is obtained. Errors in the technique are discussed and methods of compensating for them are enumerated.
AD-653 200 HC$3.00 MF$0.65

GROUND-BASED PHOTOMETRIC SURVEILLANCE OF THE PASSIVE GEODETIC SATELLITE.
Goodyear Aerospace Corp., Akron, Ohio.
R. H. Emmons, R. L. Hostetler, R. J. Preski, C. L. Rogers, and D. C. Romick. Jun 67, 107p
NASA-CR-791
Contract NAS1-6189

Descriptors: *Pageos, *Photometry, Curvature, Data, Ground, Light, Magnitude, Passive, Passive geodetic earth orbiting satellite, Radius, Reduction, Reflection, Satellite, Stellar, Surveillance.

For abstract, see STAR 05 14.
N67-27291 HC$3.00 MF$0.65

17I. RADAR DETECTION

RADAR TARGET DETECTION AS INFLUENCED BY EXPERIENCE AND TRAINING.
Research memo.,
George Washington Univ., Alexandria, Va. Human Resources Research Office.
A. D. Wright, Edward W. Frederickson, and James L. Claflin. 20 Oct 64, 61p
Contract DA-44-188-ARO-2

Descriptors: (*Radar tracking, Training), (*Radar operators, Performance (Human)), (*Target recognition, Reliability), Effectiveness, Measurement, Simulators, Display systems, Radar equipment.

This report describes two tests comparing the performance of experienced and inexperienced radar observers in detecting targets on the searchtype or plan position indicator (PPI) display of radar systems. The first test used ADHRU laboratory simulation facilities which displayed a single target in a single ecm strobe. A second test used the NIKE Hercules system and the AN/MPQ36 radar target and ecm simulator. The results of the second test confirmed those of the first test. Although reliable differences in detection range existed among individual observers, these differences were not due to job experience. (Author)
AD-455 767 HC$3.00

AN INTRODUCTION TO PSEUDO-NOISE MODULATION,
Harry Diamond Labs., Washington, D. C.
J. P. Chandler. 30 Jan 64, 46p TM-64-4

Descriptors: (*Modulation, *Pseudo-random systems), Radar jamming, Noise (Radar), Statistical functions, Communication systems, Sequences, Continuous wave radar, Doppler radar, Phase shift, Information theory.

The chief purpose of this report is to provide an introduction to pseudo-noise modulation functions and to describe those properties that make their use in radar systems desirable. Because of the interests of these laboratories, characteristics applicable to fuzes are emphasized. The applicability and usefulness of various pseudo-noise modulation functions in radar systems is discussed. The use of the m-sequence in a complete radar system is described, and an extensive bibliography of other applications to radar systems is also given. A short section containing classified information on jamming of pseudo-noise modulated radars, with bibliography, is issued as a supplement to this report. Three appendices, on mesh relations for sequences with two-level autocorrelation, on the shift-and-add relations, and on filter integration of m-sequences, are presented. (Author)
AD-479 308 HC$3.00 MF$0.65

FILTER BANDWIDTH STUDY OF AN AFC SYSTEM.
Texas Univ Austin Defense Research Lab
For primary bibliographic entry see Field 9E.
AD-652 800 HC$3.00 MF$0.65

SCATTERING CROSS SECTIONS OF MICROWAVE ANTENNAS.
Master's thesis,
Texas Univ Austin Defense Research Lab
Donald L. Albertson. Jan 62, 56p Rept no. DRL-470
Contract NOrd-16498
Prepared in cooperation with Johns Hopkins Univ., Silver Spring, Md. Applied Physics Lab., CF-2944.

Descriptors: (*Radar antennas, Microwave frequency), (*Radar echo areas, Radar antennas), Theses, Horn antennas, Parabolic antennas, X band, Microwave equipment, Measurement, Performance (Engineering), Scattering.

The effective radar cross sections of a number of horn and parabolic reflec tor microwave antennas were measured. X-band radiation was used throughout, but antennas designed for use at C-, X-, and K- band were measured. A low-power radar was used, designed for indoor operation and possessing a feature whereby the return from background objects was nulled out. (Author)
AD-652 803 HC$3.00 MF$0.65

RADAR PRECIPITATION ECHOES. EXPERIMENTS ON TEMPORAL, SPATIAL, AND FREQUENCY CORRELATION.
Technical memo.,
Johns Hopkins Univ Silver Spring Md Applied Physics Lab
F. E. Nathanson, and J. P. Reilly. Apr 67, 55p
Rept no. TG-899
Contract NOw-62-0604

Descriptors: (*Atmospheric precipitation, *Radar clutter), (*Radar echo areas, *Meteorological radar), Performance (Engineering), Wind, Rain, Backscattering, Radar equipment, Radar signals, Simulation.

Radar clutter, the unwanted echoes from the sea, terrain, precipitation, or chaff, can seriously limit radar performance. While numerous clutter rejection techniques have been proposed, the radar engineer has often been unable to evaluate them accurately because descriptions of the properties of the clutter signals are often inaccurate or incomplete. What the engineer needs, then, is a reasonably complete model of the clutter environment. In response to this need, the MRT Group of the Applied Physics Laboratory performed a series of experiments during 1966 to describe the characteristics of clutter in a manner that would suit the needs of the radar engineer. This document summarizes the results of experiments on precipitation clutter. The goal of these experiments was to provide for the radar engineer a description of the spectrum, the spatial uniformity, and the frequency correlation properties of precipitation echoes. These experiments resulted in a more complete description of the clutter spectra than has heretofore been available. The wind shear phenomenon was found to have a dominant effect on the spectra at distant ranges. Other results show that the mean backscatter cross section is rarely uniform in space and that the frequency correlation characteristics confirm the theory predicting that echoes from pulses separated in frequency by at least the reciprocal of the pulse width are uncorrelated.
AD-652 818 HC$3.00 MF$0.65

TRAJECTORY EQUATIONS OF MOTION IN RADAR POLAR COORDINATES.
Technical note,
Massachusetts Inst of Tech Lexington Lincoln Lab
Sebastian F. Catalano. 24 May 67, 17p Rept no. TN-1967-25
ESD-TR-67-276
Contract AF 19 (628)-5167, ARPA Order-498

Descriptors: (*Radar tracking, Equations of motion), Gravity, Drag, Ballistics, Algorithms, Trajectories, Radar, Theory.
Identifiers: Radar coordinates.

The equations of motion of a body under the influence of the earth's gravity and atmospheric drag are obtained in radar polar coordinates. The choice of this coordinate system may have important advantages in various tracking and filtering algorithms. A rotating ellipsoidal earth .with gravitational terms up through the second (easily extendable) harmonic is assumed. The effects of a nonspherical earth along with the corresponding effects of the higher gravitational harmonics can be important in the estimation of ballistic coefficients at very low deceleration levels. (Author)
AD-652 841 HC$3.00 MF$0.65

ON THE THEORY OF WIND MEASUREMENT WITH INCOHERENT RADAR,
Northeastern Univ Boston Mass Dept of Electrical Engineering
Walter H. Lob, 1 Jul 66, 32p Rept no. Scientific-2 AFCRL-66-501
Contract AF 19(628)-4956

Descriptors: (*Meteorological radar, *Measurement), (*Wind, Meteorological radar), Incoherent scattering, Antennas, Theory, Contamination, Statistical functions, Reflectivity, Dopple r systems, Mathematical analysis.

The ideas of Atlas and Wexler on wind measurement using a dual-beam incoherent radar have been extended. An alternate theory for this measurement technique is presented. It is shown that the normalized Doppler spectrum can be obtained by convolving the normalized contamination spectrum (shifted by the radial component of the wind) with the normalized antenna pattern (stretched by the tangential component of the wind). This approach allows the following generalizations from the theory of Atlas and Wexler: The two beams need not be identical in shape and peak gain; The individual antenna patterns need not be Gaussian; The angle between the beams may be large; The volumes observed by the two beams need not have equal reflectivity and equal contamination variance. (Author)
AD-652 857 HC$3.00 MF$0.65

DOPPLER WAVE RECOGNITION WITH HIGH CLUTTER REJECTION,
Harry Diamond Labs Washington D C
H. P. Kalmus. Apr 67, 22p Rept no. HDL-TR-1349

Descriptors: (*Doppler radar, Target acquisition), Radar clutter, Detection, Radar targets, Correlators.

A Doppler Radar is described which makes it possible to detect moving targets deeply embedded in clutter noise. The system is based on the use of quadrature detection and a new low level correlator. Most of the required amplification takes place after correlation and integration so that amplifier overloading can be avoided. (Author)
AD-652 878 HC$3.00 MF$0.65

INVESTIGATION OF RBDE-5 HORIZONTAL DISPLAY AC INTERFERENCE PROBLEM.
Final rept.,
National Aviation Facilities Experimental Center Atlantic City N J
Floyd B. Woodson, and Leo J. Wapelhorst. Apr 67, 15p
FAA-RD-66-51

Descriptors: (*Display systems, *Radar equipment), Radar interference, Search radar, Air traffic control systems, Scanning.

An investigation was performed at NAFEC, Atlantic City, New Jersey, to determine the source of ac interference on the TV roster of the RBDE-5 horizontal display when operated at vertical sync rates other than ac line frequency. It was concluded that the interference ('swimming') was caused by ac potential differences between gound points within the display. The recommendation is made that all RBDE-5 horizontal displays be modified to insure proper contact between critical ground points. (Author)
AD-652 938 HC$3.00 MF$0.65

AN INVESTIGATION OF TARGET ENHANCEMENT THROUGH USE OF A MULTI-PHOSPHOR CATHODE RAY TUBE.
Final rept., 18 Jun 65-28 Feb 67,
Stromberg-Carlson Corp San Diego Calif Data Products Div
R. S. French. 5 May 67, 65p Rept no. S-C-9991021
Contract Nonr-4931 (00)

Descriptors: (*Target recognition, *Cathode ray tubes), Detection, Targets, Colors, Tracking, Phosphorescent materials, Display systems, Tables, Data, Analysis.

Utilizing a specially manufactured multi-phosphor cathode-ray tube (CRT), this study investigated the hypothesis that target detectability on a simulated radar/sonar-type display is enhanced if the target abruptly changes color as it moves across the display. A secondary objective of the study was to obtain information on the relative detectability of the target in each of the eight phosphors tested. The task for each of 52 Navy sonar school students was the detection of a moving target imbedded in visual noise. The special design multi-phosphor CRT contained eight commonly used radar and television phosphors arranged in wedge-shaped sectors around the tube face. The subjects task was to scan the entire tube face during the brief period of target presentation and to determine in which phosphor the target appeared. The test consisted of 64 trials during which two experimental conditions were presented on alternate trials. Under one set of conditions, the target appeared at a sector boundary and moved 45 degrees to an adjacent sector boundary, entirely within a given phosphor color. Under the alternate set of conditions, the target appeared at the medial line of a sector and moved to the medial line of an adjacent sector, resulting in an abrupt change of color midway in the target path. The major sources of variance tested were: (a) color-change/no-color-change, (b) orientation of the tube face, (c) phosphor differences, and (d) clockwise/counterclockwise rotation of the target. The results of the study showed that the no-color-change condition enhanced detectability when compared to the color-change condition. (Author)
AD-652 980 HC$3.00 MF$0.65

RADAR ANGELS AND ATMOSPHERIC CONVECTION IN ARIZONA.
Technical rept.,
Army Electronics Command Fort Huachuca Ariz Research Div
Arthur V. Carlson. Mar 67, 37p
ECOM-6025

Descriptors: (*Radar reflections, *Convection (Atmospheric)), Clouds, Atmospheric refraction, Insects, Cumulus clouds, Meteorological phenomena, Atmospheric temperature, Radiosondes.
Identifiers: Radar angels.

Anomalous clear atmosphere returns of X-Band vertically pointing radar signals observed at Fort Huachuca, Arizona, during September - October 1964, are examined in conjunction with analysis of low level atmospheric convection. It is concluded that the radar echoes, commonly termed dot angels were produced by sharp gradients in refractive index across the boundary surfaces of convective air parcels. (Author)
AD-653 014 HC$3.00 MF$0.65

THE EFFECTS OF AUTOMATIC GAIN CONTROL PERFORMANCE ON THE TRACKING ACCURACY OF MONOPULSE RADAR SYSTEMS.
Revised ed.,
Naval Research Lab Washington D C
J. H. Dunn, and D. D. Howard. 17 Dec 58, 7p
Revision of manuscript submitted 24 Oct 58.
Availability: Published in Proceedings of the IRE v47 n3 p432-5 Mar 1959.

Descriptors: (*Monopulse radar, *Radar tracking), Radar equipment, Noise (Radar), Automatic gain control, Performance (Engineering), Reflectivity, Bandwidth, Errors, Radar targets, Circuits, Analysis.

Finite size targets with complex structure such as aircraft present to a radar several reflecting surfaces distributed in space, and these surfaces will move randomly in respect to the radar with the normal yaw, roll and pitch of the aircraft. The resulting random wander of the apparent source of the target echo causes a corresponding fluctuation called target noise in the output of the radar angle-error detectors and a wander of the radar antenna during closed-loop tracking of the target. This wander is called tracking noise. The tracking noise, caused by a finite size target, internal noise and other noise sources, can be minimized by choice of the parameters of the radar AGC (automatic gain control) circuitry and servo-system. Previous papers published on this subject were restricted to open-loop analysis and with assumption of negligible tracking error; however, the analysis in this paper includes actual closed-loop tracking data of a practical tracking radar and shows that under practical tracking conditions a short-time-constant fast-acting AGC will minimize tracking noise. Furthermore, it is shown that the servo-bandwidth should be kept at the minimum value that is consistent with tactical requirements. (Author)
AD-653 042 Not available from CFSTI.

ON THE SCIENTIFIC USE OF A SATELLITE RADAR SYSTEM.
Naval Research Lab Washington D C
For primary bibliographic entry see Field 4A.
AD-653 065 HC$3.00 MF$0.65

SPACE-TIME CORRELATION THEORY FOR INFORMATION-CARRYING SIGNALS.
Hughes Aircraft Co Culver City Calif Aerospace Group
For primary bibliographic entry see Field 9D.
AD-653 124 Not available from CFSTI.

RADAR OBSERVATIONS OF VENUS AT 3.8-cm WAVELENGTH,
Massachusetts Inst of Tech Lexington Lincoln Lab
For primary bibliographic entry see Field 3A.
AD-653 360 Not available from CFSTI.

ON THE STRUCTURE OF HURRICANE JANICE (1958).
National Hurricane Research Lab., Miami, Fla.
For primary bibliographic entry see Field 4B.
PB-174 666 HC$3.00 MF$0.65

ON THE STRUCTURE OF HURRICANE ELLA (1962).
National Hurricane Research Lab., Miami, Fla.
For primary bibliographic entry see Field 4B.
PB-174 667 HC$3.00 MF$0.65

FEATURES AND MOTIONS OF RADAR ECHOES ON PALM SUNDAY, 1965.
Chicago Univ., Ill. Satellite and Mesometeorology Research Project.
For primary bibliographic entry see Field 4B.
PB-174 797 HC$3.00 MF$0.65

17J. SEISMIC DETECTION

VESIAC MONTHLY BULLETIN OF VELA UNIFORM RESEARCH PUBLICATIONS.
Michigan Univ Ann Arbor Inst of Science and Technology
For primary bibliographic entry see Field 8K.
AD-653 186 HC$3.00 MF$0.65

18. NUCLEAR SCIENCE AND TECHNOLOGY

18A. FUSION DEVICES (THERMONUCLEAR)

ANNUAL REPORT, JANUARY 1-DECEMBER 31, 1965.
Princeton Univ., N. J. Plasma Physics Lab.
Apr 66, 336p
Contract AT (30-1)-1238

Descriptors: (*Plasma physics, *Thermonuclear reactions), (*Cyclotrons, Resonance), Mirrors, Electric fields, Afterglows, Stability, Viscosity.

For abstract, see NSA 21 12.
MATT-Q-23 HC$3.00 MF$0.65

18B. ISOTOPES

GALACTIC DEUTERIUM AND ITS ENERGY SPECTRUM ABOVE 20 MeV PER NUCLEON,
Chicago Univ Ill Enrico Fermi Inst for Nuclear Studies
For primary bibliographic entry see Field 3B.
AD-652 949 Not available from CFSTI.

RADIOISOTOPE APPLICATIONS IN HYDROSPACE. VOLUME I. RISE CONCEPTUAL DESIGN.
Final rept.
Aerojet-General Nucleonics, San Ramon , Calif.
Oct 65, 101p
Contract AT (04-3)-368

Descriptors: (*Energy conversion, Radioactive isotopes), (*Radioactive isotopes, Cobalt).
Identifiers: Hydrospace.

For abstract, see NSA 21 02.
AGN-8163-Vol-1 HC$3.00 MF$0.65

RADIOISOTOPE GAUGE FOR MONITORING SUSPENDED SEDIMENT CONCENTRATION IN RIVERS AND STREAMS,
Parametrics, Inc., Waltham, Mass.
Bach Sellers, John Papadopoulos, and Charles A. Ziegler. 30 Apr 66, 66p
Contract AT (30-1)-2983
For abstract see NSA 21 06.

Descriptors: (*Rivers, Sedimentation), (*Radioactive isotopes, Nuclear industrial applications), Meters, Radiation monitors, Inland waterways, Hydrology, Sampling, Calibration.

For abstract, see NSA 20 15.
NYO-2983-1 HC$3.00 MF$0.65

COST-BENEFIT STUDY OF SELECTED PRODUCTS IN ATOMIC ENERGY COMMISSIONS LOW-DOSE FOOD IRRADIATION PROGRAM.
Daniel Yankelovich, Inc., New York.
For primary bibliographic entry see Field 6H.
For abstract, see NSA 21 12.
NYO-3666-1 HC$3.00 MF$0.65

INVESTIGATION OF GAMMA-SPECTRA OF 75 SE, 106 RH, 110M AG, 124 SB, 125 SB, 140 BA, 140 LA, AND 154 EU.
Issledovanie Gamma-spektrov 75se, 106rh, 110mag, 124sb, 125sb, 140ba, 140la I 154eu
Joint Inst. for Nuclear Research, Dubna (USSR). Lab. of Neutron Physics.
1966, 73p JINR-P6-2986
in Russian

Descriptors: *Gamma radiation, *Spectrometry, Antimony, Barium, Decay, Europium, Gamma, Germanium, Isotope, Lanthanum 140, Lithium, Radiation, Rhodium 106, Selenium, Silver, Spectrum, Transition.

For abstract, see STAR 05 14.
N67-27344 HC$3.00 MF$0.65

RADIOISOTOPES IN THE BIOLOGICAL SCIENCES. AN ANNOTATED BIBLIOGRAPHY OF SELECTED LITERATURE,
Division of Technical Information Extension (AEC), Oak Ridge, Tenn.
For primary bibliographic entry see Field 6R.
For abstract, see NSA 21 12.
TID-3585 HC$3.00 MF$0.65

NUCLEAR REACTION Q-VALUES,
California Univ., Berkeley. Lawrence Radiation Lab.
C. Maples, G. W. Goth, and J. Cerny. Jul 66, 363p
Contract W-7405-eng-48

Descriptors: (*Radioactive isotopes, Atomic properties), (*Nuclear reactions, Radioactive isotopes).

For abstract, see NSA 21 02.
UCRL-16964 HC$3.00 MF$0.65

18C. NUCLEAR EXPLOSIONS

TELLURIC CURRENT MICROPULSATION BURSTS,
Alaska Univ College Geophysical Inst
For primary bibliographic entry see Field 8N.
AD-652 860 Not available from CFSTI.

BLAST-INDUCED TRANSLATIONAL EFFECTS.
Technical progress rept.,
Lovelace Foundation for Medical Education and Research Albuquerque N Mex
E. Royce Fletcher, and I. Gerald Bowen. Nov 66, 42p
DASA-1859
Contract DA-49-146-XZ-372

Descriptors: (*Blast, Mathematical models), Nuclear explosions, Shock waves, Predictions, Pressure, Velocity, Motion, Spheres, Animals, Geometric forms, Rock (Geology), Humans, Acceleration, Deceleration, Tumbling, Debris, Wind.

A mathematical model was developed to predict the time displacement histories of objects translated by the blast winds from conventional or nuclear explosions; these predictions were then compared to actual experiments. The objects studied varied in size from 139 mg spheres to man and were all assumed to be free to move over a smooth horizontal surface. The effects of ground friction could either be included or neglected, but when they were considered the ground friction eventually brought the objects to rest after the winds had passed. The values of ground friction used were determined experimentally and were found to be functions of the velocity and mass of the object being displaced. The translational model was general enough for either classical or nonclassical blast waves to be considered. Results for a chemical explosion were obtained by using both the computed blast waves of various authors and the experimentally determined blast waves. These predicted results were compared with each other as well as with experimental data obtained with steel spheres. The model was used to determine dynamic pressure impulses necessary to explain the measured sphere velocities at three ranges from ground zero. Another mathematical model was briefly described which was developed to compute the detailed two-dimentional trajectories of objects as they roll, slide, and bounce along the ground. The model closely predicted the measured distances between bounces and the total displacements of concrete blocks and large stones and thus helped to explain the mechanisms of tumbling by which an irregular object may become airborne during both the accelerative and the decelerative phases of displacement. (Author)
AD-653 130 HC$3.00 MF$0.65

AN EXPERIMENTAL INVESTIGATION OF FRANGIBLE PLATE FRAGMENTATION.
IIT Research Inst Chicago Ill
For primary bibliographic entry see Field 20K.
AD-653 162 HC$3.00 MF$0.65

REPLY,
Stanford Univ Calif Dept of Geophysics
A. Ben-Menahem, and R. L. Kovach. 26 Apr 66, 5p
AROD-6135:3
Contract DA-31-124-ARO (D)-417
Prepared in cooperation with Calif. Inst. of Tech. Pasadena Seismological Lab.
Availability: Published in Journal of Geophysical Research, v17 n19 p4703-4, 1 Oct 1966.

Descriptors: (*Nuclear explosions, *Upper atmosphere), Ionosphere, Functions, Problem solving, Approximation (Mathematics), Errors, Differential equations, Integration, Resonant frequency, Velocity, Resonance, High altitude, Magnetohydrodynamics.

The paper demonstrates the existence of MHD resonance in the upper atmosphere excited by high-altitude nuclear explosions. A simple theoretical model was chosen, which could explain the observed spectral lines of the MHD waves recorded at a number of stations on both hemispheres. It is the purpose of this note to extend the theoretical results in 1 and at the same time to correct some minor errors.
AD-653 243 Not available from CFSTI.

ENERGY AND ANGULAR DISTRIBUTION OF NEUTRONS AND GAMMA RAYS OPERATION BREN,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 6R.
For abstract, see NSA 21 12.
CEX-62.12 HC$3.00 MF$0.65

GAS EQUATION OF STATE FOR NATURAL MATERIALS,
California Univ., Livermore. Lawrence Radiation Lab.
T. R. Butkovich. 24 Jan 67, 25p
Contract W-7405-eng-48

Descriptors: (*Nuclear explosions, Underground), (*Gases, Equations of state), Cratering, Gas ionization, Thermodynamics, Thermochemistry, Vaporization, Density.

For abstract, see NSA 21 12.
UCRL-14729 HC$3.00 MF$0.65

COMPUTER PROGRAM FOR CALCULATING THE ATMOSPHERIC DISPERSION OF LARGE CLOUDS,
California Univ., Livermore. Lawrence Radiation Lab.
Todd V. Crawford. 23 Nov 66, 58p
Contract W-7405-eng-48

Descriptors: (*Clouds, *Atmospheric motion), (*Upper atmosphere, Computer programs), Diffusion.

For abstract, see NSA 21 12.
UCRL-50179 HC$3.00 MF$0.65

18D. NUCLEAR INSTRUMENTATION

SPATIAL DISTRIBUTION OF ENERGETIC ELECTRONS IN THE GEOMAGNETIC TAIL.
Chicago Univ Ill Enrico Fermi Inst for Nuclear Studies
For primary bibliographic entry see Field 4A.
AD-652 950 Not available from CFSTI.

ANISOTROPIC PROPAGATION OF SOLAR PROTONS DEDUCED FROM SIMULTANEOUS OBSERVATIONS BY EARTH SATELLITES AND THE MARINER-IV SPACE PROBE,
Chicago Univ Ill Enrico Fermi Inst for Nuclear Studies
For primary bibliographic entry see Field 3B.
AD-652 951 Not available from CFSTI.

HIGH-INTENSITY RADIATION DOSIMETRY WITH SEMIRAD (SECONDARY-ELECTRON MIXED-RADIATION DOSIMETERS).
Army Research and Development mono. Series, Army Electronics Command Fort Monmouth NJ
Stanley Kronenberg. Sep 66, 95p
USARDS-3
Availability: Hard copy available from Superintendent of Documents, GPO, Washington, D. C., 20402, $1.75.

Descriptors: (*Dosimeters, Reviews), Radiation measurement systems, Secondary emission, Ionization chambers, Vacuum, Dose rate, Sensitivity, Pulse amplifiers, Circuits, Electric connectors, Calibration, Sensitivity, Neutron flux, Neutron counters, Diodes.
Identifiers: SEMIRAD.

Contents: Principles of SEMIRAD radiation detectors; SEMIRAD vacuum considerations; SEMIRAD dose-rate limitations; SEMIRAD sensitivity; SEMIRAD energy dependence; Emission of secondary electrons by high-energy particles; SEMIRAD pulse amplification and cable connection; Calibration of SEMIRAD; Instruments with wide sensitivity range; Measurement of fast-neutron fluxes in an environment of fast neutrons and gamma rays; Construction of SEMIRAD diodes and diode-type dosimeters; Pulsed radiation rate measurements with SEMIRAD.
AD-653 037 MF$0.65

A GAMMA RAY DETECTING SYSTEM.
Final rept.,
Franklin Inst Swarthmore Pa Bartol Research Foundation
Doublas M. Van Patter, and Peter F. Hinrichsen.
26 May 67, 37p
AFOSR-67-1215
Grant AF-AFOSR-1110-66

Descriptors: (*Nuclear radiation spectrometers, Design), Coincidence counting, Instrumentation, Operation, Semiconductor devices, Germanium, Sodium compounds, Iodides, Impurities, Lithium, Thallium, Rings, Circuits, Calibration, Nuclear reactions, Gamma emission.
Identifiers: Sodium iodide.

A versatile gamma-ray detecting system has been brought into operation. It is a coincidence-anti-coincidence Ge (Li)-NaI (Tl) spectrometer, mounted on a turntable to permit the measurements of angular distributions of gamma radiations, produced by nuclear reactions involving charged particles. It consists of a central 20 cc Ge (Li) detector surrounded by a large NaI (Tl) annulus which is split into two optically-insulated halves. The method of processing events allows four different spectra to be stored simultaneously under identical gain conditions. Initial experiments using this system are outlined, as well as possible future uses and developments. For purposes of comparison, other new systems are described. (Author)
AD-653 217 HC$3.00 MF$0.65

A PHOTOMETRIC DEVICE FOR THE IDENTIFICATION OF MULTIPLY CHARGED PARTICLES STOPPING IN NUCLEAR EMULSIONS,
Lund Univ (Sweden) Dept of Physics
K. Kristiansson, A. Ladd, and L. Malmqvist. Sep 66, 19p
AFOSR-67-1284
Grant AF-EOAR-35-66
Availability: Published in Arkiv fuer Fysik v34 n13 p139-52 1967.

Descriptors: (*Charged particles, Particle trajectories), (*Particle trajectories, Scanning), Optical instruments, Photomultipliers, Photographic emulsions, Cosmic rays, Fission products, Elementary particles, Sweden.
Identifiers: Nuclear emulsions.

The paper describes a track photometer suitable for the identification of multiply charged particles stopping in nuclear emulsions. The apparatus consists of a microscope whose eye-piece has been replaced by a slit system and a photomultiplier connected to a pen recorder. The image of the track moves across the narrow slit, placed in front of the photomultiplier, and absorption profiles are obtained and registered by the recorder. The particle charge is obtained from the mean widths of the profiles. The standard error of the charge determinations amounts to about 0.2 units of charge in the interval $3<Z<10$ when a residual range of 800 microns is measured. Emulsion distortion effects seem to increase the errors in the charge determination of particles heavier than oxygen. (Author)
AD-653 354 Not available from CFSTI.

HEAVY WATER ORGANIC COOLED REACTOR. GAMMA-GAMMA COINCIDENCE COUNTING APPLIED TO CHLORINE ANALYSIS BY NEUTRON ACTIVATION,
Atomics International-Combustion Engineering.
E. T. Bramlitt. 30 Sep 66, 37p
Contract AT (38-1)-430

Descriptors: (*Heavy water reactors, Coolants), (*Neutron activation, Chlorine), Coincidence counting.
For abstract, see NSA 21 01.
AI-CE-35 HC$3.00 MF$0.65

IN-CELL RECORDING OPTICAL SPECTROMETER,
Battelle-Northwest, Richland, Wash. Pacific Northwest Lab.
U. L. Upson, and E. J. Wheelwright. Mar 67, 21p
Conf-660933-5
Contract AT (45-1)-1830
Prepared for presentation at Conference on Analytical Chemistry in Nuclear Technology (10th), Gatlinburg, Tenn.

Descriptors: (*Spectrum analyzers, Optics), (*Chemical analysis, Symposia), Fission products, Radiochemistry, Ion exchange, Recovery, Recording systems, Rare earths, Absorption spectrum.

For abstract, see NSA 21 12.
BNWL-337 HC$3.00 MF$0.65

DOSIMETRY TECHNOLOGY STUDIES, 1965.
Battelle-Northwest, Richland, Wash. Pacific Northwest Lab.
For primary bibliographic entry see Field 6R.
For abstract, see NSA 21 12.
BNWL-339 HC$3.00 MF$0.65

INTERNATIONAL SYMPOSIUM ON DEVELOPMENTS IN IRRADIATION CAPSULE TECHNOLOGY HELD AT PLEASANTON, CALIFORNIA, MAY 3-5, 1966.
Division of Reactor Development and Technology (AEC), Washington, D. C.
Donna R. Hoffman. Mar 67, 932p

Descriptors: (*Nuclear radiation, Symposia), (*Reactor materials, Radiation damage), Liquid metals, Computer programs, Digital computers, Heat transfer.

For abstract, see NSA 21 12.
CONF-660511 HC$3.00 MF$0.65

SPECTRAL ENERGY DISTRIBUTION OF UNFILTERED X-RAYS FROM A 250 KV CONSTANT POTENTIAL MACHINE,
Health and Safety Lab., New York Operations Office (AEC), N. Y.
For primary bibliographic entry see Field 6R.
For abstract, see NSA 20 24.
HASL-179 HC$3.00 MF$0.65

ANNUAL REPORT OF DIVISION ANALYTICAL BRANCH FOR 1965,
Phillips Petroleum Co., Idaho Falls, Idaho. Atomic Energy Div.
Ralph C. Shank. Jun 66, 233p
Contract AT (10-1)-205

Descriptors: (*Chemical analysis, Reviews), (*Spectroscopy, Nuclear physics).

For abstract, see NSA 20 23.
IDO-14679 HC$3.00 MF$0.65

SOLID STATE ELECTRONIC CIRCUITS FOR THE LINE RECORDER MASS SPECTROMETER,
Oak Ridge Gaseous Diffusion Plant, Tenn.
H. A. Kermicle, and G. B. Seaborn. 10 Apr 67, 22p
Contract W-7405-eng-26

Descriptors: (*Mass spectroscopy, *Spectrum analyzers), (*Recording systems, Electronic equipment), Wiring diagrams, Power supplies, Semiconductor devices.

For abstract, see NSA 21 12.
K-1692 HC$3.00 MF$0.65

DETERMINATION OF THE THREE CONVERSION COEFFICIENTS IN THE DECAY OF AU198 WITH SEMICONDUCTOR COUNTERS.
Instituto de Investigacion Aeronautica Y Espacial, Buenos Aires (Argentina).
For primary bibliographic entry see Field 18H.
For abstract, see STAR 05 14.
N67-27120 HC$3.00 MF$0.65

A SIMPLE ELECTRONIC INSTRUMENT FOR CONTINUOUS INTEGRATION OF TIME-VARIABLE MEASURING FUNCTIONS.
Ein Einfaches Elektronisches Geraet Zur Fortlaufenden Integration Zeitlich Veraenderlicher Messgroessen
Deutsche Versuchsanstalt Fur Luft- Und Raumfahrt, Munich (West Germany). Institut Fuer Physik Der Atmosphere.
H. Dahlem, and D. Paffrath. Feb 67, 18p DVL-594, DLR-FB-67-13
in German, English Summary

Descriptors: *Digital integrator, *Dosimetry, *Electronic recording instrument, Analog, Device, Digital, Electronic, Frequency, Function, Instrument, Integrator, Interval, Measurement, Oscillation, Recording, Study, Sweep, Time, Voltage.

For abstract, see STAR 05 14.
N67-27129 HC$3.00 MF$0.65

MODEL 1232-01 SCINTILLATION DOSIMETER FOR MEASUREMENT OF THE DOSAGE RATE OF X-RADIATION AND GAMMA-RADIATION.
Oak Ridge National Lab., Tenn.
M. I. Arsaev, B. F. Osipov, and H. E. Sulimova.
1964, 14p ORNL-TR-1476
Transl. Into English From Russian

Descriptors: *Dosimeter, *Gamma radiation, *Scintillation, *X-ray irradiation, Detector, Flux, Gamma, Irradiation, Power, Radiation, Response, Supply, Time, X-ray.

For abstract, see STAR 05 14.
N67-27340 HC$3.00 MF$0.65

THE LARGE-SURFACE PROPORTIONAL COUNTER.
Das Grossflaechenproportionalzaehlrohr
Kernforschungszentrum, Karlsruhe (West Germany). Schule Fuer Kerntechnik.
H. Kiefer. Mar 66, 117p KFK-411
in German

Descriptors: *Proportional counter, *Radiation measurement, Air, Alpha, Beta, Counter, Dose, Dust, Energy, Measurement, Monito r, Particle, Plutonium 239, Proportion, Radiation, Radioactivity, Tritium, Water, X-ray.

For abstract, see STAR 05 14.
N67-27343 HC$3.00 MF$0.65

A FABRY-PEROT DUOCHROMATOR FOR THE MEASUREMENT OF SMALL WAVELENGTH DISPLACEMENTS OF SPECTRAL LINES,
Oak Ridge National Lab., Tenn.
Joseph G. Hirschberg, and Walter I. Fried. Nov 66, 18p
Contract W-7405-eng-26

Descriptors: (*Line spectrum, Helium), (*Plasma physics, Instrumentation).

For abstract, see NSA 21 03.
ORNL-4019 HC$3.00 MF$0.65

TECHNIQUE FOR DRIFTING LITHIUM INTO GERMANIUM,
California Univ., Berkeley. Lawrence Radiation Lab.
David A. Jenkins. Jan 67, 12p
Contract W-7405-eng-48

Descriptors: (*Single crystals, *Germanium), (*Lithium, Solid state physics), Gamma rays, Detectors, Radiation measurement systems, Diodes, Doping, Impurities, Diffusion.

For abstract, see NSA 21 12.
UCRL-17317 HC$3.00 MF$0.65

18E. NUCLEAR POWER PLANTS

FIRST TARGET PROGRAMME FOR THE EUROPEAN ATOMIC ENERGY COMMUNITY.
European Atomic Energy Community, Brussels (Belgium). Directorate-general for Inuustry and Economy.
P. De Groote. Mar 66, 362p EUR-2773.E

Descriptors: *Electric energy, *Europe, *Nuclear energy, *Plutonium, *Thorium, *Uranium, Community, Economics, Electric, Energy, Fuel, Market, Nuclear, Production, Program, Reactor, Summary, Target, Trend.

For abstract, see STAR 05 14.
N67-27551 HC$3.00 MF$0.65

18F. RADIATION SHIELDING AND PROTECTION

NEUTRON FLUXES IN CONCRETE DUCTS DUE TO INCIDENT EPICADMIUM NEUTRONS: CALCULATIONS AND EXPERIMENTS,
Oak Ridge National Lab Tenn
R. E. Maerker, and F. J. Muckenthaler. 17 May 67, 45p Rept no. ORNL-TM-1794
Supported by DASA.
Availability: Published in Unidentified journal.

Descriptors: (*Neutron flux, *Ducts), Shielding, Thermal neutrons, Distribution, Monte Carlo method, Albedo, Reflection, Dose rate, Neutron capture gamma rays.

Monte Carlo calculations were carried out to determine subcadmium and epicadmium neutron flux distributions along the center line of a straight, a two-legged, and a three-legged square concrete duct arising from the slowing down of incident epicadmium neutrons for a particularly demanding source geometry and spectrum. The calculations used albedo data differential both in the reflected angles and reflected energy which were reported previously for concrete (See AD-642 522 and AD-649 617). A comparison of the results of these calculations with those from a geometrically similar experiment shows good agreement and places on a firm foundation the concept of treating neutron slowing down in a concrete duct as a reflection phenomenon at a point which is describable by the differential albedo properties of the walls. The conclusion is also reached that the dose rates arising from the subcadmium neutrons (whether due to an epicadmium source or a subcadmium source) and associated secondary wall capture gamma rays can comprise a very important part of the total absorbed dose rate in tissue deep inside a multilegged duct. (Author)
AD-652 794 Not available from CFSTI.

THE PREPARATION OF SIMPLIFIED MANUALS FOR SHIELDING ANALYSIS.
Conesco Watertown Mass
For primary bibliographic entry see Field 6R.
AD-652 873 HC$3.00 MF$0.65

THE PREPARATION OF SIMPLIFIED MANUALS FOR SHIELDING ANALYSIS. SUPPLEMENT I: 'IN AND DOWN' SCATTERING AND FINITE FIELDS OF CONTAMINATION.
Conesco Watertown Mass
For primary bibliographic entry see Field 6R.
AD-652 874 HC$3.00 MF$0.65

EXPERIMENTAL DETERMINATION OF NEUTRON ENERGY SPECTRA IN CONCRETE DUCTS.
Naval Civil Engineering Lab Port Hueneme Calif
For primary bibliographic entry see Field 18H.
AD-653 076 HC$3.00 MF$0.65

GAMMA-RAY TRANSPORT PROPERTIES OF A CYLINDER PLACED BEHIND AND AXIALLY PERPENDICULAR TO A SLAB,
Naval Radiological Defense Lab San F rancisco Calif
George E. Plummer, and Bruce W. Shumway. 11 Apr 67, 40p Rept no. USNRDL-TR-67-42

Descriptors: (*Shielding, Transport properties), (*Gamma rays, Shielding), Steel, Cylindrical bodies, Dose rate, Gamma-ray scattering, Attenuation, Ships.

A series of concentric annular zones on a steel slab were irradiated serially by a fixed, point gamma-ray source. Exposure rate measurements were made behind the barrier along the normal from the source. Next a steel cylindrical partition was placed behind the barrier with its axis normal to the slab. This partition was in contact with the slab and concentric with the source detector axis. Exposure rate measurements along the axis were repeated. The two sets of measurements are presented and compared zone by zone to see what changes were brought about by the insertion of the partition. (Author)
AD-653 079 HC$3.00 MF$0.65

ENERGY AND ANGULAR DISTRIBUTION OF NEUTRONS AND GAMMA RAYS OPERATION BREN,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 6R.
For abstract, see NSA 21 12.
CEX-62.12 HC$3.00 MF$0.65

QADHD POINT-KERNEL RADIATION SHIELDING COMPUTER CODE TO EVALUATE PROPELLANT HEATING AND DOSE TO CREW DURING ENGINE OPERATION.
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
G. P. Lahti. Jun 67, 89p NASA-TM-X-1397
Contract 121-30-02-22

Descriptors: *Computer program, *Propellant, *Radiation dose, *Shielding, *Spacecrew, Computer, Dose, Engine, Fast, Fortran, Gamma, Heating, Kernel, Neutron, Operation, Point, Program, Radiation, Reactor.

For abstract, see STAR 05 14.
N67-27615 HC$3.00 MF$0.65

ADJOINT AND IMPORTANCE IN MONTE CARLO APPLICATION,
Oak Ridge National Lab., Tenn.
R. R. Coveyou, V. R. Cain, and K. J. Yost. Apr 67, 64p
Contract W-7405-eng-26

Descriptors: (*Reactor shielding calculations), *Monte Carlo method), (*Reactor feasibility studies, Problem solving), Sampling, Integral equations, Nuclear radiation, Penetration, Predictions, Absorption.

For abstract, see NSA 21 12.
ORNL-4093 HC$3.00 MF$0.65

18G. RADIOACTIVE WASTES

THE INFLUENCE OF SOURCE GEOMETRY FISSION-FRAGMENT ESCAPE PROPERTIES,
American Museum of Natural History New York Dept of Animal Behavior
E. E. Lewis, and R. Pfeffer. 19 May 66, 5p
Availability: Published in Nuclear Science and Engineering v27 p581-5 1967.

Descriptors: (*Fission products, Sources), Configuration, Emissivity, Nuclear spectroscopy, Uranium compounds, Dioxides, Probability, Charged particles.

A formalism based on the Dirac chord method is extended from a previous paper (see AD-640 740) to provide an analytical method for determining the properties of small fission-fragment sources of arbitrary convex geometry. The fragment escape probabilities, energy spectra, and energy deposition fractions are determined for spherical, slab, and cylindrical uranium-dioxide sources, using an energy-loss model that contains initial-energy spectra and range-energy relations for 42 fragment species. For comparison, calculations are also made, using two simplified energy-loss models. Finally, a method is given for generalizing the results to sources containing materials other than uranium dioxide. (Author)
AD-653 347 Not available from CFSTI.

SOLIDIFICATION OF HIGH LEVEL WASTES. PART VI. MIXED PHOSPHATE, BORATE, SILICATE MELTS FOR FIXATION OF PUREX TYPE WASTES.
Battelle-Northwest, Richland, Wash. Pacific Northwest Lab.
G. B. Barton. Jan 67, 45p
Contract AT (45-1)-1830

Descriptors: (*Radioactive waste, Additives), Phosphates, Borates, Silicates, Statistical analysis, Melting, Mixtures, Oxidation.

For abstract, see NSA 21 12.
BNWL-373 HC$3.00 MF$0.65

A STUDY ON THE RELEASE OF FISSION GASES FROM UO2 SAMPLES IRRADIATED TO VARIED DOSES QUARTERLY REPORT, JUL. - SEP. 1966.
Societa Ricerche Impianti Nucleari, Saluggia (Italy). Centro Ricerche Nucleari.
Sep 66, 19p EURAEC-1772, EUR-3319
Contract EURATOM-043-65 TEEI/RD/

Descriptors: *Fission product, *Uranium oxide, Area, Dose, Fission, Gas, Oxide, Product, Radiation, Reactor, Surface, Uranium.

For abstract, see STAR 05 14.
N67-27345 HC$3.00 MF$0.65

18H. RADIOACTIVITY

A METHOD FOR IMPROVING ACCURACY OF AIR PARTICULATE ACTIVITY MEASUREMENTS,
Naval Medical Research Lab., New London, Conn.
For primary bibliographic entry see Field 6R.
AD-401 763 HC$3.00

THE DEVELOPMENT OF A WATER-SURFACE BURST FALLOUT MODEL: THE RISE AND EXPANSION OF THE ATOMIC CLOUD,
Naval Radiological Defense Lab., San Francisco, Calif.
For primary bibliographic entry see Field 15F.
AD-441 983 HC$3.00

EXPERIMENTAL DETERMINATION OF NEUTRON ENERGY SPECTRA IN CONCRETE DUCTS.
Technical rept.,
Naval Civil Engineering Lab Port Hueneme Calif
Leonard B. Gardner, Alan J. Mettler, and Bernard Burdick. May 67, 101p Rept no. NCEL-TR-523

Descriptors: (*Neutron detectors, *Fallout shelters), (*Concrete, *Ducts), Foils, Dose rate, Neutron spectrum, Underground structures, Indium, Cadmium, Geometry, Programming (Computers), Monte Carlo method, Excitation, Radioactive fallout, Absorption, Measurement, Tests.

Neutron energy spectra were experimentally determined at various positions in air ducts through concrete. The ducted concrete structures studied were built as model entranceways for protective shelters. The spectra were determined for the case of 14-Mev neutrons impinging on the duct entrance, and were based on activation analysis of threshold foil detectors, foil sandwiches, and bare and cadmium-covered indium foils. The experimentally determined spectra were compared to available spectra calculated by Monte Carlo techniques utilizing the ADONIS computer code. From the spectra the dose was calculated and the results were normalized to the dose in free air at one centimeter from the source. The normalized dose, as a function of distance in the duct from the source, is graphically compared for the several analysis techniques. The data presented demonstrate that it is possible to determine the neutron energy spectrum in ducts by the technique of foil activation. Such determinations are useful during the experimental optimization of the protection factor for the duct in which the inclusion of doors, traps, liners, and special wall materials are considered. The data presented herein form a basis for understanding the effect of duct geometry on the protection factor, that is, the inverse of the dose rate at various positions in the duct normalized to the dose rate at the entrance of the duct. (Author)
AD-653 076 HC$3.00 MF$0.65

RADIATION DAMAGE IN SOLIDS: COMPILATION OF ABSTRACTS,
Library of Congress Washington D C Aerospace Technology Div
Joseph Andrushis. 14 Mar 67, 88p Rept no.
ATD-67-14
TT-67-62079
Rept. on Surveys of Foreign Scientific and Technical Literature. Baseddon Soviet-Satellite Open Sources, published 1965-1966. See also AD-635 088.

Descriptors: (*Radiation damage, Solids), Semiconductors, Metals, Alloys, Polymers, Alkali metal compounds, Halides, Ferroelectric materials, Magnetic materials, Glass, Electronic equipment, Semiconductor devices, Organic materials, Reviews, Abstracts, USSR.

Abstracts are given of Soviet papers dealing with the interaction of nuclear radiation with the following solids: semiconductors, metals and alloys, polymers, alkali halides, ferroelectric materials, paramagnetic materials, glasses, devices and components, miscellaneous materials.
AD-653 185 HC$3.00 MF$0.65

1964 ENVIRONMENTAL MONITORING RADIATION LEVELS AT BROOKHAVEN NATIONAL LABORATORY,
Brookhaven National Lab., Upton, N. Y.
For primary bibliographic entry see Field 6F.
For abstract, see NSA 21 12.
BNL-50001 HC$3.00 MF$0.65

TRUNK FORTRAN PROGRAM FOR THE BUCKLING OF TRUNCATED SPHERES,
Battelle-Northwest, Richland, Wash. Pacific Northwest Lab.
F. R. Czerniejewski. Feb 67, 47p
Contract AT (45-1)-1830

Descriptors: (*Buckling (Neutron density), Spheres), (*Programming languages, Geometry), Plutonium, Numerical methods and procedures.

For abstract, see NSA 21 12.
BNWL-330 HC$3.00 MF$0.65

A STUDY OF TUNGSTEN-TECHNETIUM ALLOYS.
Battelle-Northwest, Richland, Wash. Pacific Northwest Lab.
For primary bibliographic entry see Field 11F.
For abstract, see NSA 21 12.
BNWL-378 HC$3.00 MF$0.65

LABORATORY FEASIBILITY STUDIES OF AQUEOUS REPROCESSING OF ZIRCONIUM DIOXIDE-URANIUM DIOXIDE FUELS,
Idaho Nuclear Corp., Idaho Falls.
For primary bibliographic entry see Field 18J.
For abstract, see NSA 21 12.
IN-1069 HC$3.00 MF$0.65

PROTECTIVE SHIPPING PACKAGES FOR 30-INCH-DIAMETER UF CYLINDERS,
Oak Ridge Gaseous Diffusion Plant, Tenn.
A. J. Mallett, and C. E. Newlon. 13 Apr 67, 46p
Contract W-7405-eng-26

Descriptors: (*Containers, Transportation), (*Packing materials, *Reactor safety systems), Protection, Fire resistant materials, Expanded plastics, Reactor fuel enrichment.

For abstract, see NSA 21 12.
K-1686 HC$3.00 MF$0.65

WEAK ALPHA AND ELECTRON-CAPTURE DECAY IN 208 PO AND 209 PO,
Mound Lab., Miamisburg, Ohio.
For primary bibliographic entry see Field 20H.
For abstract, see NSA 21 04.
MLM-1251 HC$3.00 MF$0.65

DETERMINATION OF THE THREE CONVERSION COEFFICIENTS IN THE DECAY OF AU198 WITH SEMICONDUCTOR COUNTERS.
Instituto de Investigacion Aeronautica Y Espacial, Buenos Aires (Argentina).
H. E. Bosch, and E. Szichman. Dec 66, 19p LR-15, AD-648754
Contract DA-ARO-49-66-G121

Descriptors: *Gold, *Internal conversion coefficient, *Radiation measurement, *Radioactive decay, *Scintillation counter, Coefficient, Conversion, Counter, Decay, Emission, Gamma, Internal, Lithium, Measurement, Nuclear physics, Radiation, Scintillation.

For abstract, see STAR 05 14.
N67-27120 HC$3.00 MF$0.65

INFLUENCE OF CO60 GAMMA IRRADIATION ON THE BULK AND SURFACE RECOMBINATION RATES IN SILICON.
North Carolina State Coll., Raleigh. Semiconductor Device Lab.
For primary bibliographic entry see Field 20L.
For abstract, see STAR 05 14.
N67-27425 HC$3.00 MF$0.65

A STUDY OF THE BLISTERING OF METAL SURFACES BY SOLAR SYSTEM IONS QUARTERLY PROGRESS REPORT, 14 JUN. - 14 SEP. 1966.
Avco Corp., Tulsa, Okla. Electronics Div.
For primary bibliographic entry see Field 11F.
For abstract, see STAR 05 14.
N67-27701 HC$3.00 MF$0.65

SEMIANNUAL PROGRESS REPORT (ON AGRICULTURAL RESEARCH), JANUARY 1-JUNE 30, 1966.
UT-AEC Agricultural Research Lab., Oak Ridge, Tenn.
For primary bibliographic entry see Field 2-.
For abstract, see NSA 21 12.
ORO-653 HC$3.00 MF$0.65

PREDICTION OF THE MAXIMUM DOSAGE TO MAN FROM THE FALLOUT OF NUCLEAR DEVICES. I. ESTIMATION OF THE MAXIMUM CONTAMINATION OF AGRICULTURAL LAND,
California Univ., Livermore. Lawrence Radiation Lab.
Arthur R. Tamplin. 3 Jan 67, 28p
Contract W-7405-eng-48

Descriptors: (*Radioactive fallout, *Radiological dosage), (*Radiological contamination, *Rural areas), Humans, Predictions, Agriculture, Countermeasures, Radiation hazards, Iodine, Nuclear explosions.

For abstract, see NSA 21 12.
UCRL-50163 pt. 1 HC$3.00 MF$0.65

ESTIMATES OF ALPHA-DECAY LIFETIMES FOR SUPERHEAVY NUCLEI,
California Univ., Livermore. Lawrence Radiation Lab.
For primary bibliographic entry see Field 7E.
For abstract, see NSA 21 12.
UCRL-50183 HC$3.00 MF$0.65

OPERATION PLUMBOB. DISTRIBUTION, CHARACTERISTICS, AND BIOTIC AVAILABILITY OF FALLOUT,
California Univ., Los Angeles. Lab. of Nuclear Medicine and Radiation Biology.
K. H. Larson, J. W. Neel, H. A. Hawthorne, H. M. Mork, and R. H. Rowland. 26 Jul 66, 276p

Descriptors: (*Radioactive fallout, Particle size), (*Radiological contamination, Debris), (*Nuclear explosions, Radioactive isotopes).

For abstract, see NSA 21 02.
WT-1488 HC$3.00 MF$0.65

18I. REACTOR ENGINEERING AND OPERATION

SAFETY ANALYSIS ASSOCIATED WITH THE PLUTONIUM RECYCLE EXPERIMENT IN EBWR,
Argonne National Lab., Ill.
B. J. Toppel, P. J. Vogelberger, Jr., and E. A. Wimunc. 6 Nov 64, 106p
Contract W-31-109-eng-38

Descriptors: (*Plutonium, *Reactor safety systems), (*Reactor fuel cladding, Cracks), Reactor operation, Pressure vessels.

For abstract, see NSA 21 12.
ANL-6841 HC$3.00 MF$0.65

FAST REACTOR TEST FACILITY (FARET). VOLUME I. DESCRIPTION AND PROGRAM,
Argonne National Lab., Ill.
J. D. Geier. Mar 66, 395p
Contract W-31-109-eng-38

Descriptors: (*Fast reactors, Test facilities), (*Control rods, Fast reactors).

For abstract, see NSA 21 03.
ANL-7168 Vol. I HC$3.00 MF$0.65

THE ELECTRICAL DESIGN OF THE EBR-II,
Argonne National Lab., Ill.
F. Verber, and H. L. Schmidt. Jun 66, 227p
Contract W-31-109-eng-38

Descriptors: (*Reactor operation, *Power supplies), (*Power transformers, Control panels), Breeder reactors, Reactor system components, Reliability, Electrical equipment, Power reactors, Reactor feasibility studies.

For abstract, see NSA 21 12.
ANL-7202 HC$3.00 MF$0.65

ON THE STEADY-STATE THERMAL STRESSES IN CYLINDRICAL FUEL PINS DUE TO AXIAL VARIATIONS IN THEIR INTERNAL HEAT-GENERATION RATE,
Argonne National Lab., Ill.
Richard A. Valentin. Dec 66, 24p
Contract W-31-109-eng-38

Descriptors: (*Thermal stresses, Nuclear engineering), (*Thermal neutrons, Neutron flux), Cylindrical bodies, Poissons ratio, Bessel functions, Thermal reactors, Reactor cores.

For abstract, see NSA 21 12.
ANL-7263 HC$3.00 MF$0.65

REACTOR DEVELOPMENT PROGRAM PROGRESS REPORT, JANUARY 1967.
Argonne National Lab., Ill.
24 Feb 67, 106p
Contract W-31-109-eng-38

Descriptors: (*Critical assemblies, *Reactor reactivity), (*Breeder reactors, *Reactor fuels), Reactor safety systems, Fast reactors, Liquid metals, Reactor cores, Plutonium.

For abstract, see NSA 21 12.
ANL-7302 HC$3.00 MF$0.65

PROGRESS RELATING TO CIVILIAN APPLICATIONS DURING JUNE 1966,
Battelle Memorial Inst., Columbus, Ohio.
Donald L. Keller. 1 Jul 66, 23p
Contract W-7405-eng-92

Descriptors: (*Gas-cooled reactors, Reactor fuels), (*Reactor materials, Radiation damage).

For abstract, see NSA 21 01.
BMI-1778 HC$3.00 MF$0.65

AN EVALUATION OF THE APPLICABILITY OF EXISTING DATA TO THE ANALYTICAL DESCRIPTION OF A NUCLEAR-REACTOR ACCIDENT,
Battelle Memorial Inst., Columbus, Ohio.
David L. Morrison, Joseph M. Genco, James A. Gieske, and Duane N. Sunderman. 12 Aug 66, 229p
EURAEC-1735
Contract W-7405-eng-92

Descriptors: (*Reactor accidents, Nuclear reactors), (*Nuclear power plants, Reactor operation), Coolants, Heat transfer, Fission products, Reactor materials.

For abstract, see NSA 21 04.
BMI-1779 HC$3.00 MF$0.65

FAST FLUX TEST FACILITY. ADOPT PROGRAM FOR STEADY-STATE PROCESS DESIGN AND COST OPTIMIZATION OF FFTF HEAT REMOVAL SYSTEMS USING HEAT DUMPS TO AIR,
Battelle-Northwest, Richland, Wash. Pacific Northwest Lab.
C. L. Goss, and H. G. Johnson. Sep 66, 218p
Contract AT (45-1)-1830

Descriptors: (*Heat exchangers, Costs), (*Computer programs, Heat exchangers).

For abstract, see NSA 21 04.
BNWL-308 HC$3.00 MF$0.65

INTERNATIONAL SYMPOSIUM ON DEVELOPMENTS IN IRRADIATION CAPSULE TECHNOLOGY HELD AT PLEASANTON, CALIFORNIA, MAY 3-5, 1966.
Division of Reactor Development and Technology (AEC), Washington, D. C.
For primary bibliographic entry see Field 18D.
For abstract, see NSA 21 12.
CONF-660511 HC$3.00 MF$0.65

ANNUAL REPORT OF DIVISION ANALYTICAL BRANCH FOR 1965,
Phillips Petroleum Co., Idaho Falls, Idaho. Atomic Energy Div.
For primary bibliographic entry see Field 18D.
For abstract, see NSA 20 23.
IDO-14679 HC$3.00 MF$0.65

SNAPTRAN EXPERIMENTAL MEASUREMENTS AND INSTRUMENTATION,
Phillips Petroleum Co., Idaho. Atomic Energy Div.
V. T. Berta. Jan 67, 174p
Contract AT (10-11)-205

Descriptors: (*Radiation measurement systems, *Reactor safety systems), Test reactors, Fast neutrons, Reactor fuels, Reactor cores.

For abstract, see NSA 21 12.
IDO-17205 HC$3.00 MF$0.65

RAVEN A COMPUTER PACKAGE FOR EVALUATING RESOLVED AND UNRESOLVED RESONANCE ABSORPTION INCLUDING PIN SHADOWING,
Phillips Petroleum Co., Idaho Falls, Idaho. Atomic Energy Div.
F. J. Wheeler. Feb 67, 43p
Contract AT (10-1)-205

Descriptors: (*Resonance absorption, *Pins (Mechanical)), (*Programming (Computers), *Coding), Input-output devices, Accuracy, Programming languages, Algebra, Corrections.

For abstract, see NSA 21 12.
IDO-17212 HC$3.00 MF$0.65

DETERMINATION OF FAST NEUTRON SPECTRA IN A HEAVY WATER REACTOR USING NUCLEAR EMULSIONS,
Iowa State Univ. of Science and Technology, Ames.
For primary bibliographic entry see Field 20H.
For abstract, see NSA 21 04.
IS-1448 HC$3.00 MF$0.65

SNAP 10A SYSTEM OPTIMIZATION,
Atomics International, Canoga Park, Calif.
For primary bibliographic entry see Field 21F.
For abstract, see NSA 21 02.
NAA-SR-11935 HC$3.00 MF$0.65

LITHIUM-BOILING POTASSIUM TEST LOOP.
Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
J. P. Davis, D. G. Griffin, G. M. Kikin, M. L. Peelgren, and W. M. Phillips. 15 Sep 66, 67p
NASA-CR-84294, JPL-TR-32-1083
Contract NAS7-100

Descriptors: *Liquid potassium, *Lithium, *Loop, *Rankine cycle, Alkali, Boiling, Electric, Liquid, Metal, Potassium, Power, Propulsion, Refractory, Spacecraft.

For abstract, see STAR 05 14.
N67-26629 HC$3.00 MF$0.65

EXPERIMENTAL STUDIES ON THE CREEP BEHAVIOR OF A PILE OF SPHERES WITH REGARD TO FUEL ELEMENT CIRCULATION IN THE CORE OF A PEBBLE-BED REACTOR.
Experimentelle Untersuchungen Zum Fliessverhalten Eines Kugelhaufens Im Hinblick Auf Den Brennelementkreislauf Im Core Eines Kugelhaufenreaktors
Kernforschungsanlage, Juelich (West Germany).
D. Bedenig. Apr 67, 103p EUR-3284.D
Contract EURATOM-003-63-1 RGAD
Refs in German, English Summary

Descriptors: *Creep analysis, *Fuel flow, *Pebble bed reactor experiment (pbre), Analysis, Bed, Behavior, Calculation, Circulation, Creep, Experiment, Flow, Fuel, Glass, Graphite, Mathematics, Model, Nuclear, Pebble, Reactor, Sphere, Steel, Stream.

For abstract, see STAR 05 14.
N67-27137 HC$3.00 MF$0.65

ACTIVATION ANALYSIS AT THE SORIN CENTER.
l'Analisi Per Attivazione Al Centro Sorin
Societa Ricerche Impianti Nucleari, Saluggia (Italy). Centro Ricerche Nucleari.
R. Malvano, and E. Zimmer. 1967, 10p SORIN-105
in Italian Presented At Convegno Sulla Chimica Delle Radiazioni E Sui Radioisotopi, Rome, 19-21 Jan. 1967

Descriptors: *Radiochemistry, *Reactor technology, *Thermal neutron, Activation, Application, Combustion, Fuel, Neutron, Photon, Reactor, Scattering, Technology, Thermal.

For abstract, see STAR 05 14.
N67-27247 HC$3.00 MF$0.65

METALLURGICAL INVESTIGATIONS AND REPAIRS MADE ON BONUS STEAM DRYER-PREHEATER AND NONDESTRUCTIVE TESTS OF OTHER REACTOR COMPONENTS.
Puerto Rico Water Resources Authority, San Juan.
C. M. Bonet, J. A. Bonnet, Jr., and A. G. Velez.
31 Oct 66, 91p PRWRA-102
Contract AT/40-1/-2672

Descriptors: *Failure, *Heater, *Power reactor, *Repair, Component, Dryer, Nondestructive, Pipe, Power, Reactor, Stainless, Steel, Technology, Testing.

For abstract, see STAR 05 14.
N67-27500 HC$3.00 MF$0.65

ORNL VERSION OF THEME I CODE A THERMAL-HYDRAULIC CODE FOR ANALYSIS OF THE HOT CHANNEL IN A FUEL BUNDLE,
Oak Ridge National Lab., Tenn.
J. P. Sanders. Nov 66, 45p
Contract W-7405-eng-26

Descriptors: (*Organic cooled reactors, Reactor fuel elements), (*Programming (Computers), Input-output devices).

For abstract, see NSA 21 04.
ORNL-4015 HC$3.00 MF$0.65

PRESSURIZED WATER REACTOR PROJECT.
Technical progress rept., 22 Oct 66-20 Jan 67.
Bettis Atomic Power Lab., Pittsburg, Pa.
20 Jan 67, 109p
Contract AT (11-1)-GEN-14

Descriptors: (*Pressurized water reactors, *Reactor fuel elements), (*Reactor cores, Reactor operation), Nuclear physics, Chemistry.

For abstract, see NSA 21 12.
WAPD-MRP-119 HC$3.00 MF$0.65

18J. REACTOR MATERIALS

FAST REACTOR TEST FACILITY (FARET). VOLUME I. DESCRIPTION AND PROGRAM,
Argonne National Lab., Ill.
For primary bibliographic entry see Field 18I.
For abstract, see NSA 21 03.
ANL-7168 Vol. I HC$3.00 MF$0.65

ON THE STEADY-STATE THERMAL STRESSES IN CYLINDRICAL FUEL PINS DUE TO AXIAL VARIATIONS IN THEIR INTERNAL HEAT-GENERATION RATE,
Argonne National Lab., Ill.
For primary bibliographic entry see Field 18I.
For abstract, see NSA 21 12.
ANL-7263 HC$3.00 MF$0.65

REACTOR DEVELOPMENT PROGRAM PROGRESS REPORT, JANUARY 1967.
Argonne National Lab., Ill.
For primary bibliographic entry see Field 18I.
For abstract, see NSA 21 12.
ANL-7302 HC$3.00 MF$0.65

PROGRESS RELATING TO CIVILIAN APPLICATIONS DURING JUNE 1966,
Battelle Memorial Inst., Columbus, Ohio.
For primary bibliographic entry see Field 18I.
For abstract, see NSA 21 01.
BMI-1778 HC$3.00 MF$0.65

PROGRESS RELATING TO CIVILIAN APPLICATIONS DURING OCTOBER THROUGH DECEMBER 1966,
Battelle Memorial Inst., Columbus, Ohio.
Donald L. Keller. 1 Jan 67, 96p
Contract W-7405-eng-92

Descriptors: (*Reactor fuel cladding, *Reactor fuels), (*Radiation damage, *Reactor materials), (*Uranium compounds, *Plutonium compounds).

For abstract, see NSA 21 12.
BMI-1791 HC$3.00 MF$0.65

A STUDY OF TUNGSTEN-TECHNETIUM ALLOYS.
Battelle-Northwest, Richland, Wash. Pacific Northwest Lab.
For primary bibliographic entry see Field 11F.
For abstract, see NSA 21 12.
BNWL-378 HC$3.00 MF$0.65

INTERNATIONAL SYMPOSIUM ON DEVELOPMENTS IN IRRADIATION CAPSULE TECHNOLOGY HELD AT PLEASANTON, CALIFORNIA, MAY 3-5, 1966.
Division of Reactor Development and Technology (AEC), Washington, D. C.
For primary bibliographic entry see Field 18D.
For abstract, see NSA 21 12.
CONF-660511 HC$3.00 MF$0.65

ANNUAL REPORT OF DIVISION ANALYTICAL BRANCH FOR 1965,
Phillips Petroleum Co., Idaho Falls, Idaho. Atomic Energy Div.
For primary bibliographic entry see Field 18D.
For abstract, see NSA 20 23.
IDO-14679 HC$3.00 MF$0.65

LABORATORY FEASIBILITY STUDIES OF AQUEOUS REPROCESSING OF ZIRCONIUM DIOXIDE-URANIUM DIOXIDE FUELS,
Idaho Nuclear Corp., Idaho Falls.
R. G. Butzman, and B. J. Newby. Mar 67, 20p
Contract AT (10-1)-1230

Descriptors: (*Zirconium compounds, Dioxides), (*Reactor fuels, *Uranium compounds), Reactor feasibility studies, Nuclear physics laboratories, Pressurized water reactors, Radioactive waste, Storage, Solvent extraction, Corrosion, Fission products.

For abstract, see NSA 21 12.
IN-1069 HC$3.00 MF$0.65

DETECTION OF PLUTONIUM PENETRATIONS THROUGH CONTAINERS AT HIGH TEMPERATURE,
Los Alamos Scientific Lab., N. Mex.
Dale M. Holm, and Bill M. Moore. Dec 66, 18p
Contract W-7405-eng-36

Descriptors: (*Plutonium, Penetration), (*Containers, High-temperature research), Radiation measurement systems, Detection, Tantalum, Radiation monitors, Corrosion, Shielding, Thermal radiation, Alpha particles.

For abstract, see NSA 21 12.
LA-3654 HC$3.00 MF$0.65

BETA-TO-ALPHA TRANSFORMATION CHARACTERISTICS OF SOME DILUTE URANIUM ALLOYS,
Mallinckrodt Chemical Works, Weldon Spring, Mo. Uranium Div.
M. F. Nolan. 1 Aug 66, 32p
Contract W-14-108-eng-8

Descriptors: (*Uranium alloys, Transformations), (*Grain structures (Metallurgy), Uranium alloys).

For abstract, see NSA 21 02.
MCW-1506 HC$3.00 MF$0.65

SPECIFICATIONS TESTING MANUAL,
Mallinckrodt Chemical Works, Weldon Springs, Mo. Uranium Div.
W. A. Ziegler. Sep 66, 609p

Descriptors: (*Reactor materials, Sampling), (*Specifications, Reactor materials).

For abstract, see NSA 21 01.
MCW-1507 HC$3.00 MF$0.65

ADVANCED REFRACTORY ALLOY CORROSION LOOP PROGRAM QUARTERLY PROGRESS REPORT, PERIOD ENDING 15 JAN. 1967.
General Electric Co., Cincinnati, Ohio.
For primary bibliographic entry see Field 11F.
For abstract, see STAR 05 14.
N67-26638 HC$3.00 MF$0.65

AN UNSOLVED PROBLEM IN METALLURGY-STRESS-RELIEF ANNEALING OF NUCLEAR REACTOR VESSELS.
Un Probleme Metallurgique Non Resolu - le Recuit de Detente des Cuves pour Reacteurs Nucleaires
European Atomic Energy Community, Brussels (Belgium).
J. Sebille. Feb 67, 23p EUR-3317.F
in French, English Summary Presented At the Panel of Experts on Recurring Inspection of Nucl. Reactor Pressure Vessels, Pilsen, Czech. 3-7 Oct. 1966

Descriptors: *Metallurgy, *Reactor technology, *Stress relaxation, *Vessel, Annealing, Fracture, Metal, Nuclear, Prevention, Property, Reactor, Relaxation, Relief, Safety, Strength, Stress, Structure, Technology.

For abstract, see STAR 05 14.
N67-27138 HC$3.00 MF$0.65

THE RADIOLYTIC AND PYROLYTIC DECOMPOSITION OF ORGANIC COOLANTS. V - THE THERMAL DECOMPOSITION OF O-TERPHENYL, M-TERPHENYL AND P-TERPHENYL IN THE PRESENCE OF ATTAPULGUS CLAY.
European Atomic Energy Community, Ispra (Italy). Chemistry Dept.
G. Juppe, and H. Rau. Mar 67, 39p EUR-3281.E

Descriptors: *Chemical kinetics, *Clay, *Polyphenyl, *Thermal decomposition, Benzene, Catalysis, Chemical, Coolant, Decomposition, Ethylene, Formation, Gas, Ion, Isomerization, Kinetics, Li-

quid, Organic, Ortho, Para, Pyrolysis, Terphenyl, Thermal.

For abstract, see STAR 05 14.
N67-27258 HC$3.00 MF$0.65

THE RADIOLYTIC AND PYROLYTIC DECOMPOSITION OF ORGANIC COOLANTS. II - THE POSTPYROLYSIS OF PREIRRADIATED OM2.
European Atomic Energy Community, Ispra (Italy). Chemistry Dept.
G. Juppe, H. Rau, G. Schuetz, and G. Wedekind.
Mar 67, 25p EUR-3287.E

Descriptors: *Chemical kinetics, *Irradiation, *Polyphenyl, *Pyrolysis, Aromatics, Benzene, Boiling, Bond, Chemical, Compound, Coolant, Decomposition, Diphenyl, Gas, Hydrocarbon, Kinetics, Liquid, Organic, Pile, Product, Radiolysis, Rate, Reaction, Terphenyl, Thermal.

For abstract, see STAR 05 14.
N67-27259 HC$3.00 MF$0.65

DIFFUSION OF RARE GASES IN SOLIDS FINAL REPORT.
Hahn-meitner-institut Fur Kernforschung, Berlin (West Germany).
F. Felix. Feb 66, 42p EURAEC-1650, EUR-2848
Contract EURATOM-028-64-1 TEE

Descriptors: *Calcium, *Gaseous diffusion, *Potassium, *Rare gas, *Silver, *Thorium, *Uranium, Activation, Compound, Diffusion, Element, Fuel, Gas, Measurement, Nuclear, Post, Rare, Solid.

For abstract, see STAR 05 14.
N67-27457 HC$3.00 MF$0.65

THE RESTRICTED RELEASE OF PLUTONIUM,
Dow Chemical Co., Golden, Colo. Rocky Flats Div.
D. C. Hung. 17 Oct 66, 65p
Contract AT (29-1)-1106
For abstract see NSA 21 06.

Descriptors: (*Plutonium, Oxidation), (*Radiation hazards, Plutonium), Reactor accidents, Leakage (Fluid), Aerosols, Airborne, Scattering, Particle size, Diffusion, Computer programs.

For abstract, see NSA 21 06.
RFP-799 HC$3.00 MF$0.65

PRESSURIZED WATER REACTOR PROJECT.
Bettis Atomic Power Lab., Pittsburg, Pa.
For primary bibliographic entry see Field 18I.
For abstract, see NSA 21 12.
WAPD-MRP-119 HC$3.00 MF$0.65

18K. REACTOR PHYSICS

REACTOR DEVELOPMENT PROGRAM PROGRESS REPORT, JANUARY 1967.
Argonne National Lab., Ill.
For primary bibliographic entry see Field 18I.
For abstract, see NSA 21 12.
ANL-7302 HC$3.00 MF$0.65

TRUNK FORTRAN PROGRAM FOR THE BUCKLING OF TRUNCATED SPHERES,
Battelle-Northwest, Richland, Wash. Pacific Northwest Lab.
For primary bibliographic entry see Field 18H.
For abstract, see NSA 21 12.
BNWL-330 HC$3.00 MF$0.65

TRANSPORT STUDY OF THE REAL AND ADJOINT FLUX FOR NASA ZERO POWER REACTOR (ZPR-I).
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
D. Fieno. May 67, 89p NASA-TN-D-3990
Contract 129-02-04-03-22

Descriptors: *Computer program, *Flux, *Transport property, *Zero power reactor (zpr), Adjoint, Cadmium, Computer, Critical, Ibm 7094 computer, Measurement, Program, Property, Reactivity, Reactor, Real, Shell, Transport.

For abstract, see STAR 05 14.
N67-26550 HC$3.00 MF$0.65

AN ANALYSIS OF CRITICAL FUEL SOLUTION REACTORS CONTAINING ARRAYS ON VOID TUBES.
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
W. Mayo. 1967, 14p NASA-TM-X-52302
Presented At the 13th Ann. Meeting of the Am. Nuclear Soc., San Diego, 11-15 Jun. 1967

Descriptors: *Reactor fuel, *Tube, Array, Calculation, Core, Critical, Cylinder, Fluoride, Fuel, Leakage, Reactor, Uranyl, Void.

For abstract, see STAR 05 14.
N67-27320 HC$3.00 MF$0.65

ADJOINT AND IMPORTANCE IN MONTE CARLO APPLICATION,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 18F.
For abstract, see NSA 21 12.
ORNL-4093 HC$3.00 MF$0.65

18L. REACTORS (POWER)

RADIOISOTOPE APPLICATIONS IN HYDROSPACE. VOLUME I. RISE CONCEPTUAL DESIGN.
Aerojet-General Nucleonics, San Ramon, Calif.
For primary bibliographic entry see Field 18B.
For abstract, see NSA 21 02.
AGN-8163-Vol-I HC$3.00 MF$0.65

SNAP 10A SYSTEM OPTIMIZATION,
Atomics International, Canoga Park, Calif.
For primary bibliographic entry see Field 21F.
For abstract, see NSA 21 02.
NAA-SR-11935 HC$3.00 MF$0.65

METALLURGICAL INVESTIGATIONS AND REPAIRS MADE ON BONUS STEAM DRYER-PREHEATER AND NONDESTRUCTIVE TESTS OF OTHER REACTOR COMPONENTS.
Puerto Rico Water Resources Authority, San Juan.
For primary bibliographic entry see Field 18I.
For abstract, see STAR 05 14.
N67-27500 HC$3.00 MF$0.65

PRESSURIZED WATER REACTOR PROJECT.
Bettis Atomic Power Lab., Pittsburg, Pa.
For primary bibliographic entry see Field 18I.
For abstract, see NSA 21 12.
WAPD-MRP-119 HC$3.00 MF$0.65

18M. REACTORS (NON-POWER)

NONTRANSIENT NUCLEAR REACTORS EXPERIMENTS ON POWER TRANSISTORS,
Army Electronics Labs., Fort Monmouth, N. J.
Frederick Gordon, Jr. 15 Jul 59, 33p USAEL-TR-2064

Descriptors: (*Radiation damage, *Transistors), (*Nuclear reactors, Transistors), Power, Shielding, Measurement, Electric currents, Gain, Tests.

The techniques and results of nuclear reactor experiments on power transistors are reported. Two reactor facilities were utilized: the Bulk Shielding Facility at Brookhaven National Laboratory, and the Curtiss-Wright Swimming-Pool Reactor at Quehanna, Pa. The following measurements were made: Grounded-emitter current gain (HEE); Reverse collector current (ICO); and Vc - Ic curves. In addition special performance tests were made on a DC-to-DC converter using lower power transistors.
AD-227 715 HC$3.00

FAST REACTOR TEST FACILITY (FARET). VOLUME I. DESCRIPTION AND PROGRAM,
Argonne National Lab., Ill.
For primary bibliographic entry see Field 18I.
For abstract, see NSA 21 03.
ANL-7168 Vol. I HC$3.00 MF$0.65

REACTOR DEVELOPMENT PROGRAM PROGRESS REPORT, JANUARY 1967.
Argonne National Lab., Ill.
For primary bibliographic entry see Field 18I.
For abstract, see NSA 21 12.
ANL-7302 HC$3.00 MF$0.65

SEFOR BETA/L MEASUREMENTS BY NOISE ANALYSIS TECHNIQUES,
Phillips Petroleum Co., Idaho Falls, Idaho. Atomic Energy Div.
R. P. Morrell. Aug 66, 50p
Contract AT (10-1)-205

Descriptors: (*Fast reactors, Reactor shutdown), (*Noise analyzers, Fast reactors).

For abstract, see NSA 21 01.
IDO-17210 HC$3.00 MF$0.65

DETERMINATION OF FAST NEUTRON SPECTRA IN A HEAVY WATER REACTOR USING NUCLEAR EMULSIONS,
Iowa State Univ. of Science and Technology, Ames.
For primary bibliographic entry see Field 20H.
For abstract, see NSA 21 04.
IS-1448 HC$3.00 MF$0.65

18N. SNAP TECHNOLOGY

SNAP 10A SYSTEM OPTIMIZATION,
Atomics International, Canoga Park, Calif.
For primary bibliographic entry see Field 21F.
For abstract, see NSA 21 02.
NAA-SR-11935 HC$3.00 MF$0.65

THEORY AND TESTING OF A SPACE RADIATOR SIMULATOR FOR A SNAP-8 GROUND TEST FACILITY.
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
R. S. Bilski, A. A. Schoenberg, and P. A. Thollot.
May 67, 45p NASA-TM-X-1375
Contract 701-04-00-02-22

Descriptors: *Simulator, *Snap-8, *Space radiator, *Tube heat exchanger, Airflow, Analysis, Control, Cooling, Equation, Exchanger, Fin, Flight, Ground, Heat, Linear, Liquid, Metal, Radiator, Space, Temperature, Test, Tube.

For abstract, see STAR 05 14.
N67-26557 HC$3.00 MF$0.65

---

19. ORDNANCE

19A. AMMUNITION, EXPLOSIVES, AND PYROTECHNICS

BLACK BODY FUNCTIONS FOR PYROTECHNICISTS,
Denver Research Inst Colo
R. M. Blunt. Mar 67, 193p Rept no. DRI-880-6703-F-App
NAD-CR-RDTR-20
Contract N164-11171

Descriptors: (*Pyrotechnics, Blackbody radiation), (*Blackbody radiation, Tables), Thermodynamics, Surface temperatures, Brightness, Power spectra, Statistical functions, Graphics.

Planck's black body data is tabulated. The data is presented from 0.35 microns to 12.0 microns in increments of 0.005 microns and at temperatures from 1500K through 4050K in 50K increments. Hemispherical power, power normalized to peak, spectral brightness, temperature exponent M, and cumulative and percentage of power between zero and the listed wavelength. In addition, graphs of the temperature exponent vs temperature and vs wavelength are included. (Author)
AD-652 822 HC$3.00 MF$0.65

DEVELOPMENT OF THE CONTINUOUS WIRE METHOD. PROGRESS REPORT III. MEASUREMENTS IN CAST DINA,
Naval Ordnance Lab White Oak Md
For primary bibliographic entry see Field 19D.
AD-652 917 HC$3.00 MF$0.65

THE WATER ADSORPTION PROPERTIES OF THE POLYMORPHS OF HMX: THE THERMODYNAMICS OF WATER INTERACTION WITH GROUND AND UNGROUND BETA-HMX.
Technical rept.,
Picatinny Arsenal Dover N J
Thomas C. Castorina, and Jerome Haberman.
May 67, 39p Rept no. PA-TR-3555

Descriptors: (*HMX, Adsorption), (*Explosive materials, Adsorption), Water, Sorption, Thermodynamics, Interactions, Surfaces, Free energy, Crystal structure, Dipole moments.

Water adsorption isotherms were measured for the polymorphs of octahydro-1,3,5,7-tetranitro-s-tetrazine (HMX). Water is found to sorb into the crystal structure in the order, gamma-HMX > alpha-HMX, and not at all into beta-HMX. The thermodynamics of water interaction with the surface of beta-HMX was studied as a function of grinding action. Grinding reduces the free surface energy of beta-HMX from 25 to 5 ergs/sq cm, and increases the hydrophobic character of the surface by a factor of 12. The calculated thermodynamic functions support the concept of adsorption of water in clusters on both ground and unground beta-HMX surfaces. The integral heat of water adsorption increases with increasing hydrophobicity. This is attributed to unhindered dipole interaction of water with the more isolated active sites of like charges. Accordingly, water is shown to become less entropic as the hydrophobicity is increased. (Author)
AD-653 027 HC$3.00 MF$0.65

ENCYCLOPEDIA OF EXPLOSIVES AND RELATED ITEMS. VOLUME 3.
Technical rept.,
Picatinny Arsenal Dover N J
Basil T. Fedoroff, and Oliver E. Sheffield. 1966, 558p Rept no. PA-TR-2700-Vol-3
See also Volume 1 - AD-257 189; Volume 2 - AD-422 747.

Descriptors: (*Explosive materials, Reviews), Propellants, Ammunition, Chemical compounds, Dictionaries.
Identifiers: Encyclopedias.

This volume contains entries 'Chlorides' through 'Detonating relays'. Each entry is supported by references to the appropriate source literature. A cumulative index of items discussed in Vols. 1, 2, and 3 is included.
AD-653 029 HC$3.00 MF$0.65

A FUZE-TELEMETRY ANTENNA-TRANSMITTER.
Harry Diamond Labs Washington D C
For primary bibliographic entry see Field 9F.
AD-653 126 HC$3.00 MF$0.65

RETARDATION AND CONDITION OF SHOT PELLETS IN FREE FLIGHT.
Ballistic Research Labs Aberdeen Proving Ground Md
For primary bibliographic entry see Field 19D.
AD-653 151 HC$3.00 MF$0.65

19B. BOMBS

STATIC WIND TUNNEL TESTS OF THE M823 RESEARCH STORE WITH FIXED AND FREE-SPINNING TAILS,
Naval Ordnance Lab White Oak Md
Frank J. Regan, Mary E. Falusi, and John E. Holmes. 5 Apr 67, 253p Rept no. NOLTR-65-14, Aerodynamics Research-243

Descriptors: (*Bombs, Stabilization systems), Free fall missiles, Wind tunnel models, Stability, Fins, Statics, Tests, Spin.
Identifiers: M823 research store.

The M823 configuration is an instrumented free fall store used in bomb stability research programs. The report presents the results of the static wind tunnel tests of the basic forebody to which have been attached various stabilizers. These stabilizers include fixed and free-spinning cruciform tails and free-spinning monoplane tails. (Author)
AD-652 815 HC$3.00 MF$0.65

19D. EXPLOSIONS, BALLISTICS, AND ARMOR

ELECTRICAL CONDUCTIVITY OF WATER UNDER SHOCK COMPRESSION.
Ballistic Research Labs., Aberdeen Proving Ground, Md.
For primary bibliographic entry see Field 20C.
AD-444 793 HC$3.00

INTERACTION OF PROJECTILES AND COMPOSITE ARMOR.
Final rept., 15 Nov 65-15 Jan 67,
Stanford Research Inst Menlo Park Calif
A. L. Florence, and T. J. Ahrens. 31 Jan 67, 137p
AMRA-CR-67-05 (F)
Contract DA-04-200-AMC-1381 (X)

Descriptors: (*Armor, Impact), (*Terminal ballistics, Projectiles), Interactions, Composite materials, Ceramic materials, Glass textiles, Laminates, Steel, Armor plate, Stresses, Oxides, Aluminum compounds, Deflection, Bending, Shock waves, Alumina.

The report describes basic experimental and theoretical work on the interaction of projectiles and lightweight composite armor. The armor of interest consists of a very hard and inflexible facing plate (ceramic) bonded to a flexible backing plate (fiber glass). Attention has been focused on the mechanism of interaction between a facing plate and a hard projectile (steel). Experimental results consist of high speed camera photographs of the projectile-armor interaction and observations of the final state of the projectile and armor. Theoretical analyses, based on the theory of elasticity, were used to established stress fields in the facing plate during the initial stages of impact and to determine deflections and bending moments during the later stages. In addition to this work on the mechanics of projectile-armor interaction, exploratory experiments were undertaken with a view toward establishing the dynamic mechanical properties of aluminum oxide, an important facing material. (Author)
AD-652 726 HC$3.00 MF$0.65

TRAJECTORY EQUATIONS OF MOTION IN RADAR POLAR COORDINATES.
Massachusetts Inst of Tech Lexington Lincoln Lab
For primary bibliographic entry see Field 17I.
AD-652 841 HC$3.00 MF$0.65

DEVELOPMENT OF THE CONTINUOUS WIRE METHOD. PROGRESS REPORT III. MEASUREMENTS IN CAST DINA,
Naval Ordnance Lab White Oak Md
D. Price, J. P. Toscano, and I. Jaffe. 20 Apr 67, 54p Rept no. NOLTR-67-10
See also AD-419 053.

Descriptors: (*Explosive materials, Detonations), (*Detonations, Test methods), Tert equipment, Resistance (Electrical), Castings, Wire, Shock waves, Circuits, Measurement.
Identifiers: DINA.

Precise continuous wire data obtained from shock-to-detonation transitions in cast DINA show that the voltage-time records cannot be interpreted directly as run length and total delay time. Corrections made for a thick conducting zone of reacted explosive needed to close the wire circuit give reasonable results. (Author)
AD-652 917 HC$3.00 MF$0.65

RETARDATION AND CONDITION OF SHOT PELLETS IN FREE FLIGHT.
Technical note,
Ballistic Research Labs Aberdeen Proving Ground Md
W. F. Donovan. Apr 67, 26p Rept no. BRL-TN-1653

Descriptors: (*Pellets, *Exterior ballistics), Drag, Free flight trajectories, Shotguns, Loading (Ordnance projectors), Aerodynamic characteristics, Damage, Distribution.

In any estimate of the trajectories of shot fired from a shotgun, the drag of the system of pellets might be expected to vary with the degree of damage incurred by the pellets and with the Mach and Reynolds Numbers. Results of experiments are presented for representative shot fired from a riot gun for five loading conditions. Pellet distributions, damage incidence, and aerodynamic retardations are determined from spark shadowgraphic traces. Pellets with severe launch damage indicated higher drag than corresponding spheres launched individually. (Author)
AD-653 151 HC$3.00 MF$0.65

19E. FIRE CONTROL AND BOMBING SYSTEMS

AN EVALUATION OF A NEW RETICLE DESIGN SYSTEM FOR GUNLAYING AGAINST FLASHES.
Research memo.,
George Washington Univ., Alexandria, Va. Human Resources Research Office.

David L. Easley. Nov 64, 24p
Contract DA-44-188-ARO-2
Revision of report dated March 1964.

Descriptors: (*Reticles, Fire control systems), (*Fire control systems, Tanks (Combat vehicles)), Gunnery, Military personnel, Firing tests (Ordnance), Human engineering, Fire control system components, Night warfare, Simulation.
Identifiers: M-60 tank.

The purpose of the research was to determine the effectiveness of utilizing a grid-type reticle, graduated in turns of the azimuth and elevation controls of the M60 tank, for gunlaying against enemy gun fire at night. Using the experimental reticle in a simulated firing situation, six experienced and seven inexperienced gunners localized and laid an M60 tank gun on each of 40 flashes. Though no group differences were significant, these two groups of gunners performed somewhat more accurately, but laid less quickly on the average, than a third group, which used the standard reticle. In the simulated situation, performance was better than it was in a field study. Factors which may have operated in the field study to degrade performance are discussed. (Author)
AD-455 070 HC$3.00

19F. GUNS

A COMPARISON OF WHOLE VERSUS PART METHODS OF MARKSMANSHIP TRAINING,
George Washington Univ., Alexandria, Va. Human Resources Research Office.
For primary bibliographic entry see Field 5I.
AD-477 646 HC$3.00 MF$0.65

20. PHYSICS

20A. ACOUSTICS

POSSIBILITY OF ION-WAVE AMPLIFICATION IN A PLASMA,
Massachusetts Inst of Tech Cambridge Research Lab of Electronics
For primary bibliographic entry see Field 20I.
AD-652 894 Not available from CFSTI.

ACOUSTICAL ACTIVITY AND RELATED PHENOMENA IN CRYSTALS.
Technical rept.,
Pennsylvania Univ Philadelphia Dept of Physics
David Lawrence Portigal. May 67, 201p Rept no. TR-12
Contract Nonr-551 (51)
Doctoral thesis.

Descriptors: (*Crystals, Acoustic p roperties), (*Tellurium, Acoustic properties), (*Phonons, Crystals), Mechanical waves, Polarization, Scattering, Refraction, Optical phenomena, Brillouin zones, Diffraction, Elasticity, Crystal lattices.

Rotatory polarization of transverse acoustic waves is considered. It is demonstrated phenomenologically that, due to spatial dispersion, such 'acoustical activity' should be observable in optically active crystal classes, its magnitude being obtainable from phonon dispersion curves. An estimate of the acoustical activity of tellurium is so obtained. An attempt to measure the acoustical activity of tellurium is described. Alignment requirements are shown to be too critical to detect activity in such trigonal crystals. The effect of conical refraction on the observation of acoustical activity is considered. A similar formalism is applied to an improved study of optical internal conical refraction. (Author)
AD-652 935 HC$3.00 MF$0.65

INTENSE RUBY-LASER-INDUCED ACOUSTIC IMPULSES IN LIQUIDS,
John Carroll Univ Cleveland Ohio Dept of Physics
E. F. Carome, C. E. Moeller, and N. A. Clark.
Dec 66, 8p
AROD-6285:2
Contract DA-31-124-ARO (D)-424, ARPA Order-675
Availability: Published in Journal of the Acoustical Society of America, v40 n6 p1462-6 Dec 1966.

Descriptors: (*Acoustics, Liquids), (*Lasers, *Ultrasonic radiation), Ruby, Microwave frequency, Light pulses.

An experimental study has been made of the acoustic signals induced in liquids by the focused beam from a Q-spoiled ruby laser. Very intense acoustic impulses have been produced with laser pulses of less than 0.05 J total energy. These appear to be generated by dielectric breakdown and not associated with the hypersonic waves that may be produced simultaneously by stimulated Brillouin scattering. The observed impulses have peak pressures of approximately 500 atm and frequency components in excess of 2400 Mc/sec. (Author)
AD-652 972 Not available from CFSTI.

RESULTS OF TESTS INVOLVING HEMISPHERICAL WIND SCREENS IN THE REDUCTION OF WIND NOISE,
Atmospheric Sciences Lab White Sands Missile Range N Mex
A. H. Breeland, and R. S. Bonner. Apr 67, 42p
ECOM-5119

Descriptors: (*Wind, Noise), (*Signal-to-noise ratio, Wind), Microphones, Acoustic properties, Shielding, Acoustic insulation, Velocity, Wind tunnels, Experimental data, Anemometers, Interference.
Identifiers: Infrasound.

Hemispherical wind screens, covered with screen mesh and acoustic cloth, are of considerable value in reducing wind noise associated with infrasonic monitoring devices and improving the signal-to-noise ratio as shown in field and wind tunnel tests. The amplitude of the wind noise below sixteen (16) cps was significantly reduced and noise components at higher frequencies were effectively eliminated. Comparison tests showed that wind screens of three feet in diameter are more effective for noise reduction than the method used in the SOTIM (sonic observation of the trajectory and impact of missiles) system. (Author)
AD-653 005 HC$3.00 MF$0.65

ACOUSTICAL AND METEOROLOGICAL DATA REPORT. SOTRAN I AND II.,
Atmospheric Sciences Lab White Sands Missile Range N Mex
For primary bibliographic entry see Field 4A.
AD-653 017 HC$3.00 MF$0.65

DIRECTIVITY OF RECEIVED OCEAN NOISE.
Bell Telephone Labs Inc Whippany N J
For primary bibliographic entry see Field 8J.
AD-653 102 HC$3.00 MF$0.65

STIMULUS-ORIENTED APPROACH TO DETECTION RE-EXAMINED,
Texas Univ Austin Defense Research Lab
Lloyd A. Jeffress. 1967, 10p Rept no. DRL-A-286
Contracts Nonr-3579 (04), NObsr-93124
Research supported in part by NASA.
Availability: Published in Journal of the Acoustical Society of America v41 n2 p480-8 Feb 1967.

Descriptors: (*Audiometry, Performance tests), (*Hearing, Simulation), (*Auditory signals, Detection), Probability density functions, Signal-to-noise ratio, Band-pass filters, Half-wave rectifiers, Integrators, Ear.

The present paper is a reexamination of some of the conclusions of an earlier one. It is motivated by some new insights resulting from attempts to replicate experiments with human observers, through the use of an electrical model of the auditory system. It is concerned primarily with the effect of signal duration on detection in the presence of a continuous masking noise. The model, of those tried, that best fits human performance consisted of a bandpass filter obtained by subtracting the output of a 500-Hz sharp-cutoff, low-pass filter from another having a cutoff of 525 Hz. The filter was followed by a linear half-wave rectifier and it, in turn, by an integrator having a 100-msec decay time. The integrator can be thought of as a device that takes a running average of its input. The probability-density distributions for N and SN yielded by the model lie between the Rayleigh-Rice distributions on the one hand and a pair of normal distributions of unequal variance on the other. The exact shape of the two distributions depends upon both the bandwidth of the filter employed and the time constant of the averager. (Author)
AD-653 123 Not available from CFSTI.

THE ANALYSIS OF NOISY NON-LINEAR DEVICES BY MEANS OF GENERALIZED RANDOM PROCESSES,
Aerospace Research Labs Wright-Patterson AFB Ohio
Donn G. Shankland. Mar 67, 24p Rept no. ARL-67-0048

Descriptors: (*Noise, *Mathematical analysis), Amplifiers, Signal-to-noise ratio, Functions, Signals, Theory, Statistical processes.

The mathematical description of noise by means of Generalized Random Processes is presented. The effects on the noise distribution of linear filters (amplifiers) is discussed and related to conventional filter theory. The modification of the noise by a quadratic device is then treated, and this formalism is then applied to the analysis of the noise performance of a correlation detector and a conventional square-law detector. The conventional detector is shown to have a superior signal-to-noise ratio. (Author)
AD-653 182 HC$3.00 MF$0.65

CHARACTERISTICS OF THE STOKES EMISSION IN THE STIMULATED BRILLOUIN SCATTERING PROCESS,
Cornell Univ Ithaca N Y School of Electrical Engineering
For primary bibliographic entry see Field 20F.
AD-653 210 HC$3.00 MF$0.65

A GENERAL DIGITAL COMPUTER PROGRAM, CODAT, FOR SOLVING NOISE TRANSMISSION PROBLEMS.
Research and development rept.,
Navy Marine Engineering Lab Annapolis Md
David R. Jordan. Mar 67, 71p Rept no. MEL-67/102

Descriptors: (*Computer programs, *Noise), (*Acoustics, Noise), Digital computers, Electrical impedance, Vibration, Programming (Computers), Complex variables, Punched cards, Computer storage devices, Data.

A digital computer program was developed for use in the study of acoustic noise transmission in machinery systems aboard Navy ships. The program interprets a list of three digit code numbers as mathematical and data input/output operations. The computations are done for complex variables, and both single elements and matrices can be manipulated with ease. The instructions may be given to the computer at a rate of 24 per card instead of 1

per card, thereby greatly reducing key punch time! Since there are relatively few code numbers, their use can be quickly mastered by persons unfamiliar with computer languages. (Author)
AD-653 294 HC$3.00 MF$0.65

DETERMINATION OF THE GAS TEMPERATURE IN THE AFTERGLOW OF PULSED DISCHARGES BY MICROWAVE PROBING OF STANDING ACOUSTIC WAVES,
Army Electronics Command Fort Monmouth N J Inst for Exploratory Research
For primary bibliographic entry see Field 20I.
AD-653 338 Not available from CFSTI.

20B. CRYSTALLOGRAPHY

F-CENTER FORMATION BY FUNDAMENTAL ABSORPTION IN KI.
Technical rept.,
Cornell Univ., Ithaca, N. Y. Materials Science Center.
F. T. Goldstein. Sep 66, 104p TR-8, MSC-545
Contract Nonr-401 (47)
Doctoral thesis.

Descriptors: (*Color centers, Halides), (*Potassium compounds, Iodides), Ultraviolet radiation, Absorption, Luminescence, Monochromatic light, Crystal lattice defects, Band spectrum.
Identifiers: Potassium iodide.

The experimental techniques employed in this work consisted of irradiating a KI crystal with ultraviolet and, in some cases, additional visible light. This irradiation resulted in the growth of color centers which were studied by measuring the growth of the absorption bands associated with the centers. The effect of bleaching on the growth was studied and in addition, various luminescence measurements were performed.
AD-643 486 HC$3.00 MF$0.65

THORIA SINGLE CRYSTALS GROWN BY VAPOR DEPOSITION IN A SOLAR FURNACE,
Avco Corp Wilmington Mass Avco Space Systems Div
T. S. Laszlo, P. J. Sheehan, and R. E. Gannon.
8 Jul 66, 13p
AFOSR-67-1139
Contract AF 49 (638)-1166
Availability: Published in J. Phys. Chem. Solids v28 p313-6 1967.

Descriptors: (*Thorium compounds, Crystal growth), (*Crystal growth, *Solar furnaces), Dioxides, Single crystals, Vapor plating, Dendritic structure, X-ray diffraction analysis, Crystal lattices.
Identifiers: Thorium oxide.

A solar furnace capable of heat fluxes corresponding to a blackbody temperature as high as 4900K was successfully used to grow ThO2 crystals from the vapor phase. This was accomplished by heating a small area of a polycrystalline ThO2 rod to temperatures well above its melting point until profuse vaporization was observed. The vapors condensed around the molten crater forming single crystals with well defined crystal habits as well as clearly defined dendrites. The preferred directions of growth were determined by X-ray diffraction analysis. This crystal growing technique also yields crystals of very high purity since the process involves a fractional condensation. The experimental technique and apparatus is described in detail. Laue diagrams of the single crystals and lattice parameters obtained from the powder pattern are also given. (Author)
AD-652 752 Not available from CFSTI.

LOW AND HIGH AMPLITUDE INTERNAL FRICTION MEASUREMENTS IN SOLIDS AND THEIR RELATION TO IMPERFECTION MOTIONS.
Technical rept.,
Columbia Univ New York Inst for the Study of Fatigue and Reliability
W. P. Mason. Mar 67, 134p Rept no. TR-46
Contract Nonr-266 (91)

Descriptors: (*Internal friction, *Dislocations), Measurement, Solids, Metals, Single crystals, Motion, Crystal lattice defects, Electrons, Phonons, Strain (Mechanics), Equations of motion, Lead, Aluminum, Copper.

The mechanical properties of single crystal and polycrystalline metals are determined largely by imperfection motions. Internal friction measurements are very sensitive methods for studying these motions. Low amplitude and high frequency measurements are conventional. A new high amplitude system capable of measuring internal friction and modulus defects is described. This can make measurements of internal friction from 0.0001 to 0.2 with strain amplitudes up to 0.01. Typical data are shown for low amplitude, high frequency and high amplitude data. These are interpreted in terms of a modified Granato Lucke model. In the linear range dislocation drag coefficients are shown to be determined by the damping of phonons and electrons. The first non-linear range is associated with the breakaway of dislocations from pinning points. The final range involves the generation of new dislocations and is associated with instabilities and fatigue in the metal. (Author)
AD-652 793 HC$3.00 MF$0.65

RESEARCH AND DEVELOPMENT OF PHYSICAL METALLURGY OF TITANIUM.
IIT Research Inst Chicago Ill
For primary bibliographic entry see Field 11F.
AD-652 829 HC$3.00 MF$0.65

CRYSTALLOGRAPHIC AND MAGNETIC INVESTIGATION OF THE RARE EARTH-COBALT COMPOUNDS R2Co17.
Technical rept., Jun 65-Jun 66,
Air Force Materials Lab Wright-Patterson AFB Ohio
Werner Ostertag, Karl Strnat, and Gary I. Hoffer.
Feb 67, 49p Rept no. AFML-TR-66-420

Descriptors: (*Rare earth compounds, Magnetic properties), (*Crystal structure, Rare earth compounds), (*Ferromagnetic materials, Rare earth compounds), (*Cobalt compounds, Ferromagnetic materials), Crystal lattices, X-ray diffraction analysis, Ferromagnetism, Moments, Transition temperature, Nuclear spins, Transport properties, Praseodymium compounds, Neodymium compounds, Samarium compounds, Gadolinium compounds, Terbium compounds, Dysprosium compounds, Holmium compounds, Erbium compounds, Thulium compounds, Lutecium compounds, Yttrium compounds, Intermetallic compounds.

A series of new compounds corresponding to the formula R2Co17, where R represents Ce, Pr, Nd, Sm, Gd, Tb, Dy, Ho, Er, Tm, Lu and Y, was prepared. Magnetic measurements showed that about one half of the R2Co17 compounds are ferrimagnetic, while the rest are simple ferromagnets. The saturation moments and Curie temperatures of all the compounds were determined. Interpretation of the structures of the compounds was made on the basis powder X-ray diffraction analysis.
AD-652 837 HC$3.00 MF$0.65

ROCK DEFORMATION AND THE DEFORMATION MECHANISMS IN TORSION TESTS.
Shell Development Co Houston Tex
For primary bibliographic entry see Field 8G.
AD-653 198 Not available from CFSTI.

DISLOCATION VELOCITIES IN A TWO-DIMENSIONAL MODEL,
Columbia Univ New York Dept of Mechanical Engineering
W. F. Hartl, and J. H. Weiner. 27 Dec 65, 12p
AFOSR-67-1253
Grant AF-AFOSR-228-63
Availability: Published in Physical Review v152 n2 p634-44 Dec 9 1966.

Descriptors: (*Crystal lattice defects, Dynamics), (*Symmetry (Crystallography), Interactions), Vibration, Stability, Motion, Velocity, Shear stresses, Computers, Simulation.

The dynamics of an edge dislocation in a two-dimensional crystal model are investigated using a localized unstable normal mode of vibration of the model. The model used is a simple-cubic lattice with linear central and noncentral nearest-neighbor interactions and a piecewise linear restoring force between atoms on the slip plane. The atoms below the slip plane are fixed. Lattice parameters are chosen to allow specific stable and unstable configurations of the lattice, and it is assumed that the dislocation progresses by passing alternately through stable and unstable states. It is found that there is one localized unstable mode of vibration whose components are very large in the neighborhood of the dislocation. This localized mode is used to approximate dislocation motion in the unstable state, and it altered--by symmetrizing it with respect to the stable lattice configuration--to approximate motion in the stable state. Two coordinates, given by harmonic equations of motion, then characterize the dynamics of the dislocation. The relation between the two coordinates gives an energy-loss mechanism which leads to a steady-state dislocation velocity when a shear stress is applied to the lattice. Transient and steady-state velocities and the minimum stress necessary to maintain a steady-state velocity are calculated. The same quantities are found using computer simulation of a finite lattice, and a comparison is made. Reasonably good agreement is found for velocities up to about 0.7 times the velocity of sound in the continuum in the direction of slip. The analytic theory underestimates the minimum stress necessary to maintain a steady-state velocity.
AD-653 303 Not available from CFSTI.

LATTICE PARAMETERS OF IRON-RICH IRON-GALLIUM ALLOYS,
California Univ San Diego La Jolla Dept of Physics
For primary bibliographic entry see Field 7D.
AD-653 304 Not available from CFSTI.

GROWTH OF COMPLEX SINGLE-CRYSTAL HEXAGONAL FERRITES,
Army Electronics Command Fort Monmouth N J Inst for Exploratory Research
R. O. Savage, and A. Tauber. 20 Feb 67, 10p
Availability: Published in Materials Research Bulletin v2 p469-78 1967.

Descriptors: (*Ferromagnetic materials, *Crystal growth), Single crystals, Barium compounds, Oxides, Iron oxides, Zinc compounds, Magnesium oxides, Nickel compounds, Cobalt compounds, Copper compounds, Manganese compounds, Phase diagrams, Complex compounds.

Numerous 'mixed-layer type' hexagonal ferrites have been grown as crystals from molten flux. Two structural series both of which belong to ternary systems of the type BaO-MeO-Fe2O3 are differentiated. In the structural series M (n)Y (p), Me was Zn, Mg, Ni, Co, Fe, Cu, and Mn. The formation of a particular structure could not be correlated with Me, flux, composition or growth conditions used within the range that they were varied. A maximum in the frequency of occurrence of crystals with 46 layers could be accounted for statistically. (Author)
AD-653 332 Not available from CFSTI.

THE GROWTH OF GAMMA-MnS CRYSTALS IN SODIUM SILICATE GELS,
Army Electronics Command Fort Monmouth N J Inst for Exploratory Research
Abraham Schwartz, Arthur Tauber, and Joel R. Shappirio. 26 Jan 67, 6p
Availability: Published in Materials Research Bulletin v2 p375-80 1967.

Descriptors: (*Manganese compounds, *Crystal growth), (*Sulfides, Crystal growth), Single crystals, Silica gel, Crystal structure, Optical properties, Spectroscopy, X-ray diffraction analysis, Refractive index.
Identifiers: Manganous sulfide.

Single crystals of gamma-MnS and alpha-MnS were grown in silica gels at temperatures between 4C and 41C. Tabular hexagonal crystals of gamma-MnS up to 1 mm across were characterized optically, spectrochemically, and by x-ray diffraction. Gamma-MnS is uniaxial positive, with a birefringence of approximately 0.022-0.032. (Author)
AD-653 336 Not available from CFSTI.

CRYSTAL GROWTH IN THICK-WALL CRUCIBLES,
Army Electronics Command Fort Monmouth N J Inst for Exploratory Research
J. R. Pastore. 1966, 2p
Proceedings of Int. Conf. on Crystal Growth, Boston, Mass. Jun 20-24 1966.
Availability: Published in Crystal Growth: Proceedings of an International Conference on Crystal Growth, Boston, 20-24 June, 1966.

Descriptors: (*Crystal growth, *Crucibles), Single crystals, Thermal properties, Cooling, Furnaces, Thickness, Walls, Graphite, Temperature, Calcium fluorides, Equilibrium, Vacuum, Thermal conductivity.

A modified Stockbarger arrangement contains thick-wall graphite crucible and an r.f. heating coil producing highly perfect crystals of CaF2 have been grown. After thermal equilibrium of the melt at 1500C, crystal growth is started by lowering the crucible through the coil at a rate of 1/4 to 3/4 in./hr. After the completed traverse, the crucible temperature is decreased to 300C in increments of 100C/5 min before the r.f. coil is turned off. The crystal remains under vacuum for two hours, and after cooling to room temperature is easily freed from the crucible by gentle tapping. This modification differs from the conventional Stockbarger method because the liquid-solid interface is free to adjust to any line voltage changes. (Author)
AD-653 340 Not available from CFSTI.

BETA EUCRYPTITE CRYSTALLINE SOLUTIONS INVOLVING P (5+).
American Museum of Natural History New York Dept of Animal Behavior
For primary bibliographic entry see Field 11B.
AD-653 346 Not available from CFSTI.

VIBRATIONS OF DEFECTS IN LATTICES, FIVE LECTURES,
Argonne National Lab., Ill.
R. J. Elliott. Jul 66, 42p
Contract W-31-109-eng-38

Descriptors: (*Crystal lattice defects, Vibration), (*Green's function, Crystal lattice defects).

For abstract, see NSA 20 24.
ANL-7237 HC$3.00 MF$0.65

A STUDY OF DEFECT STRUCTURES WITH THE FIELD ION MICROSCOPE SEMIANNUAL REPORT, SEP. 1, 1966 - FEB. 28, 1967.
Florida Univ., Gainesville.
J. J. Hren, R. W. Newman, and R. C. Sanwald.
28 Feb 67, 12p NASA-CR-84415, SAR-2
Contract NGR-10-005-039

Descriptors: *Crystal structure defect, *Ion emission, *Ion microscope, *Stress distribution, Bcc, Crystal, Defect, Distribution, Emission, Fcc, Field, Image, Ion, Material, Metal, Microscope, Platinum, Stress, Structure.

For abstract, see STAR 05 14.
N67-27374 HC$3.00 MF$0.65

20C. ELECTRICITY AND MAGNETISM

ELECTRICAL CONDUCTIVITY OF WATER UNDER SHOCK COMPRESSION.
Memorandum rept.,
Ballistic Research Labs., Aberdeen Proving Ground, Md.
Richard E. Yuknavech. Mar 64, 25p BRL-MR-1563

Descriptors: (*Water, *Electrical conductance), (*Shock waves, Water), Compressive properties, Resistance (Electrical), Pressure, Explosion effects.

The electrical conductivity of water under shock compression was measured from 40 to 194 kilobars. Measurements were made on a 0.051 cm x 0.254 cm x 0.762 cm volume of water contained in a polyethylene conductivity cell. The results are in agreement with those of David and Hamann; and Brish, Tarasov and Tsukerman who used a different technique. It was found that the conductivity could be represented by the equation, sigma = 133 exp. 552/T, where sigma is the conductivity in 1/ohm/cm and T is the shock temperature in degrees Kelvin as calculated for water by Rice and Walsh. (Author)
AD-444 793 HC$3.00

MECHANISMS OF ENERGY TRANSFER IN DIELECTRICS.
Semiannual rept. no. 1, 1 Feb-31 Aug 66,
New York Univ N Y Radiation and Solid State Lab
Hartmut P. Kallmann, and Werner Brandt. May 67, 30p
ECOM-01999-1
Contract DA-28-043-AMC-01999 (E)

Descriptors: (*Dielectrics, Charged particles), (*Defects (Materials), Dielectrics), Anthracenes, Styrenes, Dielectric properties, X rays, Electric insulation, Polymers, Photoconductivity, Annihilation radiation, Positronium.

Experimental and theoretical studies of the influence of X-rays on the electric behavior of dielectric materials have been undertaken. Their ultimate goal is to determine the number of free charges produced by a given amount of energy absorbed in various dielectric materials, the external field strength necessary to collect all the charges made available by X-rays, and the number of trapping sites for positive and negative charges produced by X-rays. Experiments with anthracene and polystyrene are described. A subnanosecond coincidence apparatus for the investigation of positron annihilation spectra in materials has been assembled, tested and calibrnted. Target chambers of various designs for studying the influence of high electric fields on these spectra are being constructed and tested. Our computer program for data analysis has been rewritten for the CDC 6600 computer of New York University Computer Center. The theory for the electric field effect is being formulated. Complementary work on the study of defects in insulators by positron annihilations is described. (Author)
AD-652 723 HC$3.00 MF$0.65

HYPERFINE INTERACTION AND ELECTRONIC RELAXATION TIME STUDIES IN MAGNETIC MATERIAL.
Final rept., 15 Jan 64-14 Jan 67,
Pennsylvania Univ Philadelphia Dept of Physics
M. E. Caspari. May 67, 6p
AROD-4387:6-P
Contract DA-31-124-ARO (D)-181

Descriptors: (*Magnetic materials, Scientific research), Mossbauer effect, Hyperfine structure, Magnetic properties, Garnet, Relaxation time.

The work was concerned with measurements of the magnetic hyperfine interaction and the electronic relaxation time of magnetic ions in various magnetic materials by the use of gamma-gamma angular correlation and Mossbauer experiments. (Author)
AD-652 727 HC$3.00 MF$0.65

THE SPIN POLARIZED HARTREE-FOCK METHOD AND THE CONTRIBUTION OF CORE POLARIZATION TO HYPERFINE FIELDS OF 4d IONS,
Massachusetts Inst of Tech Cambridge National Magnet Lab
A. J. Freeman, P. Bagus, and R. E. Watson. 1966, 8p
AFOSR-67-1162
Contract AF 49 (638)-1468
Prepared in cooperation with Argonne National Lab., Ill., and Brookhaven National Lab., Upton, N. Y.
Availability: Published in Colloques Internationaux du Centre National de la Recherche Scientifique n164 p293-8 Jun 20-24 1966.

Descriptors: (*Hyperfine structure, *Hartree-Fock approximation), Ions, Molybdenium, Technetium, Ruthenium, Palladium, Atomic energy levels, Nuclear spins, Wave functions.

A study was made of the contribution of core polarization to observed hyperfine fields, Hc, of 4d ions using the spin-polarized Hartree-Fock (SPHF) method. As a starting basis use was made of analytic restricted Hartree-Fock solutions obtained previously. Results obtained for the 6S state ions Mo (+), Tc (2+), and Ru (3+) and for Pd (2+) and Pd (3+), show that Hc is large and negative and is due almost entirely to the negative 2s and 4s contribution is positive. While the individual s-shell contributions vary with ion, Hc per spin is constant (to within 5%), unlike the much cruder constancy noted earlier for the 3d ions. Detailed comparisons are made with earlier results for the 3d ions. Hc per unpaired spin is found to be -375 kG per unpaired spin, in very good agreement with experiments on Pd metal, e.g., from Knight shift measurements. Seitchik et al fine that Hc per spin is -345 plus or minus 10 kG per unpaired spin. (Author)
AD-652 756 Not available from CFSTI.

CRYSTALLOGRAPHIC AND MAGNETIC INVESTIGATION OF THE RARE EARTH-COBALT COMPOUNDS R2Co17.
Air Force Materials Lab Wright-Patterson AFB Ohio
For primary bibliographic entry see Field 20B.
AD-652 837 HC$3.00 MF$0.65

PEARL TYPE TELLURIC CURRENT MICROPULSATIONS AT COLLEGE.
Alaska Univ College Geophysical Inst
For primary bibliographic entry see Field 8N.
AD-652 858 Not available from CFSTI.

THE EFFECT OF TOPOGRAPHY AND GEOLOGY ON TELLURIC CURRENTS.

Alaska Univ College Geophysical Inst
For primary bibliographic entry see Field 8N.
AD-652 859 Not available from CFSTI.

TELLURIC CURRENT MICROPULSATION BURSTS,
Alaska Univ College Geophysical Inst
For primary bibliographic entry see Field 8N.
AD-652 860 Not available from CFSTI.

AURORAL-ZONE TELLURIC-CURRENT MICROPULSATIONS T LESS THAN 20 SECONDS.
Alaska Univ College Geophysical Inst
For primary bibliographic entry see Field 8N.
AD-652 861 Not available from CFSTI.

PERIODIC COVARIATION OF RADIOWAVE ABSORPTION, EARTH CURRENTS AND OTHER ASSOCIATED PHENOMENA IN THE AURORAL ZONE.
Alaska Univ College Geophysical Inst
For primary bibliographic entry see Field 8N.
AD-652 862 Not available from CFSTI.

PEARL-TYPE MICROPULSATIONS ASSOCIATED WITH MAGNETIC STORM SUDDEN COMMENCEMENTS.
Alaska Univ College Geophysical Inst
For primary bibliographic entry see Field 8N.
AD-652 863 Not available from CFSTI.

INTRA- AND INTERHEMISPHERE DIFFERENCES IN OCCURRENCE TIMES OF HYDROMAGNETIC EMISSIONS.
Alaska Univ College Geophysical Inst
For primary bibliographic entry see Field 8N.
AD-652 864 Not available from CFSTI.

EVENING MICROPULSATION EVENTS WITH A RISING MIDFREQUENCY CHARACTERISTIC,
Alaska Univ College Geophysical Inst
For primary bibliographic entry see Field 8N.
AD-652 865 Not available from CFSTI.

DISTRIBUTION OF MECHANICAL FORCES IN MAGNETISED MATERIAL AND EVALUATION OF MAGNETIC ENERGY DENSITY IN MAGNETISED MATTER,
Massachusetts Inst of Tech Cambridge Research Lab of Electronics
P. Penfield. 1966, 2p
Contract DA-36-039-AMC-03200 (E)
Availability: Published in Proc. IEE v113 n12 p2096-7 Dec 1966.

Descriptors: (*Magnetism, Models (Simulations)), Magnetic fields, Deformation, Elasticity, Hydrodynamics, Analysis, Permeability (Magnetic), Force (Mechanics).

This gives a brief discussion concerning the dipole model, the current-loop model, and a composite dipole/current-loop model of electromagnetic field theory.
AD-652 903 Not available from CFSTI.

ELECTROMAGNETIC MOMENTUM IN A MATERIAL MEDIUM,
Massachusetts Inst of Tech Cambridge Research Lab of Electronics
P. Penfield. 23 May 66, 2p
Contract DA-36-039-AMC-03200 (E)
Availability: Published in Proc. IEE. v113 n11 p1875-6 Nov 1966.

Descriptors: (*Electromagnetism, Momentum), Electromagnetic fields, Materials, Theory, Integral equations.
Identifiers: Electromagnetic momentum.

This brief paper discusses the defining equation for electromagnetic momentum, and compares it with a recent definition given by E. G. Cullwick.
AD-652 904 Not available from CFSTI.

ABSOLUTE ELECTRIC FIELD MEASUREMENTS USING FIELD MILLS,
Naval Research Lab Washington D C
Stuart G. Gathman, and Eva Mae Trent. 26 Apr 67, 16p Rept no. NRL-6538

Descriptors: (*Electric fields, *Measurement), Meters, Calibration, Geometry, Atmosphere, Inverters, Errors, Time, Accuracy.

In order to measure absolute values of electric field, an accurate method of calibration of field meters must be obtained. One purpose of calibration is to relate electric output from an inverted field meter to the true field. One method of calibration allows absolute values of electric field from a flush-mounted field meter. A new way of combining the geometry of the field meter mount and atmospheric space charge results in only a slight improvement in measurement error over a former method of calibration involving only time averages. Nevertheless, the experiment points out that atmospheric space charge affects in a complicated manner measurements made with inverted field mills. (Author)
AD-652 928 HC$3.00 MF$0.65

HARTREE-FOCK APPROXIMATION TO THE HEISENBERG ANTI-FERROMAGNET,
Ohio State Univ Columbus Dept of Physics
C. C. Sung. 14 Feb 66, 4p
AFOSR-67-1207
Grant AF-AFOSR-869-65
Availability: Published in Physical Review v148 n1 p299-301 Aug 5 1966.

Descriptors: (*Antiferromagnetism, *Hartree-Fock approximation), (*Nuclear spins, Hartree-Fock approximation), Crystal substructure, Green's function, Ground state, Hamiltonian, Low-temperature research.
Identifiers: Heisenberg antiferromagnet.

The properties of a Heisenberg antiferromagnet at low temperatures are calculated by assuming the two-sublattice structure and by using the double-time Green's-function formalism. The two-particle Green's function is decoupleu according to the Hartree-Fock approximation, which differs from the random-phase approximation by an additional term. Since the two-particle Green's function in this problem contains particles of different lattices, the kinematical condition does not enter into this approximation. Numerical results for the ground-state energy and the magnetization are presented. (Author)
AD-652 984 Not available from CFSTI.

SUPERCONDUCTIVITY OF LANTHANUM AND LANTHANUM COMPOUNDS AT ZERO AND HIGH PRESSURE.
Revised ed.,
California Univ San Diego La Jolla
T. F. Smith, and H. L. Luo. 28 Sep 66, 10p
AFOSR-67-1213
Grant AF-AFOSR-631-64
Revision of manuscript submitted 18 Jul 66.
Availability: Published in Journal of Physical Chemical Solids v28 p569-76 1967.

Descriptors: (*Lanthanum compounds, *Superconductivity), (*Lanthanum, Superconductivity), Intermetallic compounds, Aluminum compounds, Gallium compounds, Zinc compounds, Magnesium compounds, Superconductors, Transition temperature, Pressure, Crystal lattices.

The superconducting transition temperatures (Tc) of the compounds La3Al, La3 a, LaZn and LaMg2 are reported. The pressure dependence of the Tc of a number of lanthanum compounds, for which the lanthanum is considered to play the dominant role in determining the occurrence of superconductivity, was measured. The data obtained suggest a strong correlation between the La-La nearest neighbor atomic separation and the Tc with a maximum Tc at an optimum separation of approx. 3.55A. (Author)
AD-652 990 Not available from CFSTI.

SUPERCONDUCTIVITY OF ALPHA-URANIUM AND URANIUM COMPOUNDS AT HIGH PRESSURE,
California Univ San Diego La Jolla Dept of Physics
W. E. Gardner, and T. F. Smith. 15 Aug 66, 9p
AFOSR-67-1211
Grant AF-AFOSR-631-64
Prepared in cooperation with Atomic Energy Research Establishment, Harwell (England).
Availability: Published in The Physical Review v154 n2 p309-15 Feb 10 1967.

Descriptors: (*Uranium, *Superconductivity), (*Uranium compounds, Superconductivity), Transition temperature, High-pressure research, Semiconductors, Intermetallic compounds, Iron compounds, Manganese compounds, Solid solutions, Uranium alloys, Molybdenum alloys.

The pressure dependence of the superconducting transition temperature Tc of alpha-uranium was measured to a maximum pressure of 22 kbar and constitutes an important extension of the pressure range of previous measurements. It was observed that Tc increases rapidly as a function of pressure up to approx. 9 kbar, passes through a broad maximum, and then decreases. A possible explanation of this behavior is offered on the basis of a pressure-induced transformation in the electronic properties of uranium. Data are also reported for observations of the Tc under pressure of the compounds U6Fe and U6Mn and the solid solution alloy U0.35 Mo0.15. (Author)
AD-652 993 Not available from CFSTI.

THE PHASE SYNCHRONIZATION OF A PARAMETRIC SUBHARMONIC OSCILLATOR.
Technical rept.,
Michigan Univ Ann Arbor Dept of Electrical Engineering
James L. Cockrell. Apr 67, 213p Rept no. 7695-178
ECOM-01870-8-T
Contract DA-28-043-AMC-01870 (E)

Descriptors: (*Synchronization (Electronics), Phase (Electronics)), Theorems, Phase detectors, Problem solving, Oscillators, Signals, Noise, Circuits, Oscillation, Gain, Voltage, Random variables, Errors, Differential equations, Capacitance, Transformers.

The general problem of phase determination for a parametric subharmonic oscillator is formulated. The analyses of several circuits are reduced to the solution of the canonical Mathieu equation. Solution is effected by the Floquet theorem and the parameters discussed in terms of the range of values encountered in experimental circuits. The transient portion of the solution produces arbitrary constants with two possible signs, yielding the two phase states of a growing oscillation. Conditions of oscillation are discussed, and the influence of signal and noise presented.
AD-653 032 HC$3.00 MF$0.65

DIELECTRIC CONSTANT OF WATER AND SUPERCOOLED WATER: EXPERIMENTAL DETERMINATIONS.
Navy Electronics Lab San Diego Calif
For primary bibliographic entry see Field 7D.
AD-653 061 HC$3.00 MF$0.65

SUPERCONDUCTING TRANSITIONS IN BODY-CENTERED CUBIC THALLIUM-INDIUM ALLOYS,
California Univ San Diego La Jolla Dept of Physics
For primary bibliographic entry see Field 20L.
AD-653 088 Not available from CFSTI.

OPTICAL AND ELECTRICAL PROPERTIES OF DIAMOND (OPTICAL AND ELECTRICAL PROPERTIES OF NON METALS).
Israel Atomic Energy Commission Yavne Soreq Nuclear Research Centre
For primary bibliographic entry see Field 20L.
AD-653 201 HC$3.00 MF$0.65

CONSTANT RESISTANCE ONE-PORTS WHICH INCLUDE NONLINEAR TIME-VARYING ELEMENTS,
California Univ Berkeley Dept of Electrical Engineering
For primary bibliographic entry see Field 9A.
AD-653 222 Not available from CFSTI.

GROWTH OF COMPLEX SINGLE-CRYSTAL HEXAGONAL FERRITES,
Army Electronics Command Fort Monmouth N J Inst for Exploratory Research
For primary bibliographic entry see Field 20B.
AD-653 332 Not available from CFSTI.

EINIGE BEMERKUNGEN ZU EINER ARBEIT VON W. KOSTER UND H.-P. RAVE UBER 'LEITFAHIGKEIT UND HALLKONSTANTE' (Some Remarks on a Paper by W. Koster and H.-P. Rave 'Conductivity and Hall Constant'),
National Research Council of Canada Ottawa (Ontario) Div of Applied Chemistry
C. M. Hurd. 19 Aug 66, 5p
NRC-9439
Text in German, summary in English.
Availability: Published in Zeitschrift fuer Metallkunde v58 n3 p194-6 1967.

Descriptors: (*Thermoelectricity, Alloys), (*Hall effect, Alloys), Conductivity, Solutions, Concentration (Chemistry), Copper alloys, Silver alloys.

The variation with solute concentration of the Hall constant (R) and the absolute thermopower (epsilon) of recrystallized alpha-phase alloys of copper and silver with B-metal solutes obtained by W. Koster and H. P. Rave (Z. Metallkde 55 (1964), 750) were considered. An interpretation is given of the maximum on the absolute value of R versus e/a and in the minimum of the absolute value of epsilon versus e/a which is observed for these alloys. From the latter interpretation the characteristic thermopowers of the B-metals dissolved in silver and copper have been determined.
AD-653 397 Not available from CFSTI.

TIME DEPENDENT NONLINEAR SOLUTION OF THE LANDAU-VLASOV EQUATIONS FOR AN ELECTRON-ION DIODE.
Michigan Univ., Ann Arbor. Electron Physics Lab.
For primary bibliographic entry see Field 12A.
AD-802 564 HC$3.00 MF$0.65

ADVANCED SUPERCONDUCTING MAGNETS INVESTIGATION QUARTERLY PROGRESS REPORT, 10 NOV. 1966 - 10 FEB. 1967.
Avco Corp., Wilmington, Mass.
Mar 67, 35p NASA-CR-84456, QPR-1
Contract NAS8-21037

Descriptors: *Electric conductivity, *Mathematical model, *Superconducting magnet, *Thermoconductivity, Coil, Composite, Conductivity, Effect, Electric, Magnet, Mathematics, Model, Superconductivity, Thermal.

For abstract, see STAR 05 14.
N67-27544 HC$3.00 MF$0.65

20D. FLUID MECHANICS

ASYMPTOTIC SOLUTIONS FOR THE EXPANSION OF GAS INTO VACUUM,
Ballistic Research Labs., Aberdeen Proving Ground, Md.
E. H. Wedemeyer. Apr 65, 27p BRL-1278

Descriptors: (*Asymptotic series, *Gas flow), Vacuum, Gases, Density, Theory, Numerical analysis, Fluid flow.

When a spherical or cylindrical gas cloud expands into vacuum, the resultant flow becomes asymptotically self-similar and independent of the original cloud diameter. An analytic solution for the asymptotic density profiles, given by Mirels and Mullen is re-examined and a new solution proposed, which gives better agreement with numerical computations. Some applications of the asymptotic solutions are discussed. (Author)
AD-465 240 HC$3.00 MF$0.65

THE DEVELOPMENT OF FREE TURBULENT SHEAR LAYERS.
Technical rept. for Jul 63-Dec 64,
Arnold Engineering Development Center, Arnold Air Force Station, Tenn.
J. P. Lamb. Nov 65, 48p AEDC-TR-65-184
Contract AF 40 (600)-1200
Prepared in cooperation with ARO, Inc., Tullahoma, Tenn.

Descriptors: (*Shear stresses, *Turbulence), Heat transfer, Compressive properties, Navier-Stokes equations, Theory, Boundary layer.

The development of a two-dimensional, free turbulent shear layer from an arbitrary initial velocity profile is analyzed theoretically. Included in the analysis are effects of both heat transfer and compressibility. The mean flow is described by approximate velocity profiles containing an unknown position parameter which is dependent upon the development length. Integral forms of the continuity and momentum equations are utilized to specify the flow characteristics along the streamline which separates the primary and secondary flow regions. By applying the Navier-Stokes equations to this dividing streamline, one is able to calculate the position parameter and thus complete the description of the developing flow field. Also presented are results of extensive calculations which show, for various external and initial flow conditions, the variation of the dividing streamline velocity, shear stress (Stanton number), and average eddy viscosity. The theory also enables one to estimate the effects of heat transfer and compressibility on the spread rate parameter for fully developed mixing zones. The theoretical results are shown to agree with experimental data from a number of sources.
AD-473 841 HC$3.00 MF$0.65

SOME DEVELOPMENT OF MARKOFF'S METHOD OF RANDOM FLIGHTS, WITH THE INTENTION OF APPLICATION TO TURBULENT FLOW.
Research rept.,
Polytechnic Inst. of Brooklyn, N. Y. Dept. of Aerospace Engineering and Applied Mechanics.
Toyoki Koga. Nov 65, 32p
PIBAL-954
Contract Nonr-839 (38), ARPA Order-529

Descriptors: (*Turbulence, *Fluid mechanics), Theory, Boundary layer, Mathematical analysis, Probability, Correlation techniques.

Markoff's method of random flights is reconsidered and developed with the intention of applying it to problems of turbulent flow. The gist is to generalize the assumption regarding the probability distribution of causal events. Correlations which may exist among causal events, and the consequences appearing in the resultant events are considered. In view of the conclusion, some of the previous authors' treatments are criticized. The correlation probability between two resultant events which are separated in space but caused by a common group of causal events is formulated. The correlation probability between two events separated in time but caused by the same group of causal events evolving in time is formulated.
AD-477 798 HC$3.00 MF$0.65

DYNAMICAL SIMILARITIES IN RAREFIED GAS FLOWS.
Interim rept.,
Polytechnic Inst. of Brooklyn, N. Y. Dept. of Aerospace Engineering and Applied Mechanics.
Toyoki Koga. Jan 66, 18p
PIBAL-964
Contract Nonr-839 (38), ARPA Order-529

Descriptors: (*Superaerodynamics, *Mathematical analysis), Theory, Fluid flow, Navier-Stokes equations, Correlation techniques.

Analyzing the procedure of the Enskog-Chapman method deriving the Navier-Stokes equation, in the criterion is obtained of the validity of the Navier-Stokes equation. It is shown that the Knudsen number constitutes a part of the criterion. In view of the criterion, flow regimes are proposed to be redefined. The conditions of the applicability of the Navier-Stokes equation to shock wave and Couette flow are studied in view of the above criterion. It is suggested that there is a possibility of revision of the slip flow theory by which the application of the Navier-Stokes equation becomes more radical in some rarefied gas flows.
AD-478 179 HC$3.00 MF$0.65

ON TWO THEORIES OF PLANE POTENTIAL FLOWS WITH FINITE GRAVITIES.
Memo rept.,
Naval Ordnance Lab., White Oak, Md.
D. Gilberg, and H. H. Rock. 29 Aug 46, 15p
NOLM-8718

Descriptors: (*Fluid flow, Mathematical models), (*Flat plate models, Fluid flow), Cavitation, Bubbles, Fluid dynamic properties, Vapor pressure, Water tunnels, Turbulence.

Two models of bounded discontinuous plane potential flows, or cavities, are discussed. The first satisfies all the mathematical conditions on a flow with free bounderies and non-zero cavitation number. The free streamlines in this model reverse direction at the rear of the cavity to form a jet extending theoretically 'through' the obstacle to infinity. The second theory artifically introduces another obstacle which closes the cavity at its rear. The mathematical solutions to the problem of flow about a flat plate are presented for both models, and calculations, including drag coefficient numbers, N, between 0 and 1.3. Both theories are found to give essentially the same results over this entire range. The drag coefficient grows almost linearly with cavitation number.
AD-492 093 HC$3.00

COLLISONS OF LIQUID DROPS WITH LIQUIDS. SUPPLEMENT I. NEW CRATER DEPTH DATA FOR IMPACTS OF WATERDROPS WITH WATER.
Technical rept.,
National Bureau of Standards, Washington, D.C.
Olive G. Engel. Jun 66, 24p
WADD-TR-60-475-Pt-2-Suppl-1
Contract AF 33 (657)-62-385

Descriptors: (*Liquids, Impact shock), (*Drops, Penetration), Cratering, Water.

The report is a supplement to WADD TR 60-475, Part II (AD-408 984), Crater Depth In Fluid Impacts. New crater depth data for impacts of waterdrops against water, which were obtained with an improved experimental arrangement, are presented and used to test the theoretical equation that was derived in the earlier report. (Author)
AD-641 302 HC$1.00 MF$0.50

RECENT DEVELOPMENTS IN HEAT-TRANSFER-RATE, PRESSURE, AND FORCE MEASUREMENTS FOR HOTSHOT TUNNELS,
Arnold Engineering Development Center, Arnold Air Force Station, Tenn.
For primary bibliographic entry see Field 14B.
AD-645 764 HC$3.00 MF$0.65

BEHAVIOR OF IONS AND QUANTIZED VORTEX RINGS OF LOW ENERGY IN HELIUM II AROUND 0.3K,
Chicago Univ Ill
Lothar Meyer. 14 Mar 66, 6p
Grant NSF-GP-2650
Availability: Published in The Physical Review v148 n1 p145-50 Aug 5 1966.

Descriptors: (*Helium, Vortices), (*Liquefied gases, *Superfluidity), Ions, Energy, Quantum mechanics, Magnetic fields, Hall effect, Cryopumping.

Quantized vortex rings of low energy down to 0.1 eV were produced in specially purified liquid helium at 0.3K and the deflection of rings of 0.15- to 0.5-eV energy in a transverse magnetic field measured. In the same apparatus the Hall mobility of positive ions was measured at 0.3K, yielding after extrapolation to zero electric field a value mu = 30000 sq cm/V/sec. The drift velocity of ions can reach 40 m/sec before vortex rings are produced, also at 0.3K. (Author)
AD-652 721 Not available from CFSTI.

AERODYNAMIC TESTING OF AN AIRBORNE LIGHTWEIGHT HIGH-EFFICIENCY RADIAL FAN.
Aerophysics Co Washington D C
For primary bibliographic entry see Field 13A.
AD-652 725 HC$3.00 MF$0.65

FREE-FLIGHT MEASUREMENT OF LOCAL TURBULENT SKIN FRICTION ON AN RM-10 VEHICLE.
Technical rept.,
Texas Univ Austin Defense Research Lab
J. C. Westkaemper, D. R. Moore, and C. E. Murphey, Jr. Jan 61, 55p Rept no. DRL-461
Contract NOrd-16498
Prepared in cooperation with Johns Hopkins Univ., Silver Spring, Md. Applied Physics Lab., CF-2913.

Descriptors: (*Test vehicles, *Skin friction), Turbulence, Flight testing, Impact shock, Aerodynamic heating, Angle of attack, Guided missiles, Instrumentation.
Identifiers: RM-10 vehicles.

In-flight skin-friction measurements were made on an RM-10 rocket test missile. A floating-element, direct-measuring skin friction balance and a surface impact probe were used. The balance performance was questionable because of errors induced by the shock of booster and sustainer rocket ignition. The impact probe method gave satisfactory results including flight times where aerodynamic heating occurred, but the results were at times influenced by angle-of-attack effects. The balance and probe data were found to agree satisfactorily with the Van Driest theory for skin friction on a flat plate with heat transfer except when the missile was at angle of attack, for which times the theory is not applicable. Recommendations for instrumentation refinements are included. (Author)
AD-652 801 HC$3.00 MF$0.65

A PRELIMINARY STUDY OF CURVED BOW SHOCK FRONTS.
Technical rept.,
Texas Univ Austin Defense Research Lab
P. H. Miller. Nov 61, 56p Rept no. DRL-478
Contract NOrd-16498
Prepared in cooperation with Johns Hopkins Univ., Silver Spring, Md. Applied Physics Lab. CF-2966.

Descriptors: (*Shock waves, *Supersonic flow), (*Bodies of revolution, Shock waves), Curved profiles, Angle of attack, Mathematical analysis, Exponential functions.
Identifiers: Curved flows.

Several curve fitting techniques were investigated in an attempt to develop an analytical expression which accurately describes the curved bow shock front produced by pointed bodies of revolution at angles of attack in a supersonic stream. The methods employed provided a curve fit with reasonable accuracy; however, from an analytical viewpoint difficulty was experienced with each of the methods in the satisfaction of one or more of the shock front boundary conditions. These difficulties were not considered serious, provided the local slope and curvature of the shock front were not required along the entire shock front. (Author)
AD-652 805 HC$3.00 MF$0.65

HEAT TRANSFER AND EQUILIBRIUM TEMPERATURE OF A SPHERE IN A SUPERSONIC FLOW OF RAREFIED GAS.
APL library bulletin translations series,
Johns Hopkins Univ Silver Spring Md Applied Physics Lab
Yu. A. Koshmarov, and N. M. Gorskaya. 24 Apr 67, 9p Rept no. TG-230-T522
TT-67-62061
Contract NOw-62-0604
Trans. of Akademiya Nauk SSSR. Izvestiya. Mekhanika Zhidkosti i Gaza, n4 p175-7 1966.

Descriptors: (*Heat transfer, Supersonic flow), Temperature, Gas flow, Spheres, Wind tunnels, Thermodynamics, Aerodynamics.

The results of experimental investigations of the equilibrium temperature and heat transfer of a sphere in a supersonic rarefied air flow are discussed. The experiments were performed in an evacuated wind tunnel; the working flows were produced by three conical nozzles. The equilibrium temperature of the sphere was measured by the stationary method. The model was kept in the flow until its temperature stopped varying with time. The mean heat-transfer coefficients were measured by the non-steady-state method. The results are shown in graphic form. (Author)
AD-652 820 HC$3.00 MF$0.65

EXPERIMENTAL INVESTIGATION OF JET-SIMULATED FLARE STABILITY OF AN OGIVE-CYLINDER AT SUPERSONIC SPEEDS.
Technical rept.,
Michigan Univ Ann Arbor Dept of Aeronautical and Astronautical Engineering
Gerard F. Carvalho. Jan 62, 27p Rept no. 03942-10-T
Contract NOrd-16595
Prepared in cooperation with Johns Hopkins Univ., Silver Spring, Md., Applied Physics Lab., CF-2949.

Descriptors: (*Bodies of revolution, Stability), (*Cylindrical bodies, *Supersonic characteristics), Ogives, Jets, Simulation, Supersonic flight, Flow visualization, Models (Simulations).

An investigation, conducted to determine the feasibility of simulating a body flare by means of jets exhausting around the circumference of the body in close proximity to the base, revealed that the stability of non-lifting bodies of revolution can be increased by use of jet-simulated flares. (Author)
AD-652 824 HC$3.00 MF$0.65

SOME LABORATORY EXPERIMENTS ON ROSSBY WAVES IN A ROTATING ANNULUS.
Technical rept.,
Woods Hole Oceanographic Institution Mass
Alan Ibbetson, and Norman Phillips. 13 Sep 65, 10p Rept no. WHOI-Ref-67-20, WHOI-Contrib-1710
Contracts N00014-66-C-0241, Nonr-2196 (00)
Prepared in cooperation with Massachusetts Inst. of Tech. Cambridge; Grant NSF-G 18985.
Availability: Published in Tellus v14 n1 p81-7 1967.

Descriptors: (*Ocean currents, Coriolis effect), (*Wave transmission, Models (Simulations)), Oceans, Fluid dynamic properties, Skin friction, Periodic variations, Viscosity, Flow visualization.
Identifiers: Rossby waves.

Rossby waves were generated by a slowly oscillating paddle in a rotating annulus of water. The variation with frequency of the real part of the wave number is very satisfactory, but the experiments give only order-of-magnitude agreement between the observed damping with distance from the source and a theoretical estimate which ignores sidewall boundary layers. Behavior of the waves in a closed basin formed by placing a barrier wall across the annulus 60 degrees up-rotation from the wave source agrees qualitatively with theoretical expectation in that at low frequencies the radial motion is concentrated in the region near the reflecting barrier. This effect is a simple generalization of Stommel's original concept of the westward intensification of steady currents and appears to be present in the oceans. (Author)
AD-652 889 Not available from CFSTI.

ANGULAR DISTRIBUTION OF FLOW FROM ORIFICES AND TUBES AT HIGH KNUDSEN NUMBERS,
Massachusetts Inst of Tech Cambridge Research Lab of Electronics
R. E. Stickney, R. F. Keating, S. Yamamoto, and W. J. Hastings. 8 Aug 66, 9p
Contract DA-36-039-AMC-03200 (E), Grant NsG-496
Availability: Published in Vacuum Science and Technology v4 n1 p10-8.

Descriptors: (*Cesium, *Gas flow), Flow fields, Distribution, Orifices, Pipes, Knudsen number, Superaerodynamics.

The flow of cesium vapor from orifices and tubes into vacuum was investigated experimentally. Using a surface ionization gauge, the intensity of the flow field was measured at various angular positions from the center line for Knudsen numbers ranging from approximately 1 to 100. The dependence of the angular distribution and centerline intensity on Knudsen number is reported for cylindrical apertures having length-to-diameter ratios of 0.04, 1.15, 3.03, and 5.63. (Author)
AD-652 905 Not available from CFSTI.

CHARACTERISTICS OF SEPARATED CYLINDRICAL BOUNDARY LAYERS,
Advisory Group for Aeronautical Research and Development Paris (France)
O. Wehrmann. Apr 60, 5p Rept no. AGARD-261
N62-15908
NATO Furnished.

Descriptors: (*Boundary layer, *Flow separation), Frequency, Jets, Velocity, Vortices, Sound, Stability, Nozzle gas flow, France.

In former publications, the frequency law for velocity fluctuations in the transition region of a jet was described. A frequency law for the so-called natural frequency could be found. The natural frequencies and their amplitude are not strictly periodical and therefore only mean values can be measured. The more exact analysis of the natural frequency has shown that the frequency of the maximum amplitude coincides with the mean value of the natural frequency. To explain the distribution of the velocity fluctuations the phase velocity was measured and, based on this, the group velocity calculated. As the investigation of the natural frequency for one discrete frequency gives only mean values, the frequency of the vortex formation was stabilized by sound energy. The result is that the group velocity has a maximum in the region of the natural frequency, which means a maximum energy transport for this frequency. (Author)
AD-652 920 HC$3.00 MF$0.65

A NUMERICAL SOLUTION OF THE ELASTOHYDRODYNAMIC FILM THICKNESS IN AN ELLIPTICAL CONTACT.
Mechanical Technology Inc Latham N Y
For primary bibliographic entry see Field 11H.
AD-652 923 HC$3.00 MF$0.65

CALCULATION OF ELASTOHYDRODYNAMIC FILM THICKNESS IN HIGH SPEED ROLLING AND SLIDING CONTACTS.
Mechanical Technology Inc Latham N Y
For primary bibliographic entry see Field 11H.
AD-652 924 HC$3.00 MF$0.65

PHASE-CHANGE PROBLEMS WITH VARIABLE TEMPERATURES.
California Univ San Diego La Jolla
For primary bibliographic entry see Field 20M.
AD-652 968 Not available from CFSTI.

EXEMPLES D'ESSAIS AERODYNAMIQUES PRIS HORS DE L'AERONAUTIQUE CLASSIQUE (Examples of Aerodynamic Tests Differing from Standard Aeronautical Tests),
Advisory Group for Aeronautical Research and Development Paris (France)
A. Martinot-Lagarde, and A. Faquet. Oct 60, 19p Rept no. AGARD-311
NATO Furnished. Text in French; summary in English.

Descriptors: (*Aerodynamics, Tests), Aeronautics, Gas flow, Oscillation, Flutter, France.

The object of the report is to describe some tests made in an aerodynamics laboratory but not forming part of standard aeronautical tests. (Author)
AD-652 995 HC$3.00 MF$0.65

DERIVATION OF HYPERBOLIC TURBULENT DIFFUSION EQUATION.
Technical rept.,
Army Electronics Command Fort Huachuca Ariz Research Div
Ronald E. Meyers. Mar 67, 25p
ECOM-6026

Descriptors: (*Atmospheric motion, Turbulence), (*Three-dimensional flow, Partial differential equations), Particles, Wind, Velocity, Diffusion, Anisotropy, Atmosphere models, Numerical methods and procedures.

A three dimensional hyperbolic differential equation based on finite correlated particle velocities is derived which is appropriate to modeling anisotropic turbulent diffusion in the atmosphere. Cauchy initial data, the mean wind, the Reynolds stress tensor, and a typical frequency of pulsation are required for complete solution. The outlines of plumes and puffs may be obtained with only knowledge of the Reynolds stress tensor and mean wind velocity. The classical parabolic diffusion equations are a limiting form of this hyperbolic model.
AD-653 015 HC$3.00 MF$0.65

A METHOD FOR GENERATING LINEAR DENSITY PROFILES IN LABORATORY TANKS,
Massachusetts Inst of Tech Cambridge Hydrodynamics Lab
Charles B. Clark, Philip J. Stockhausen, and John F. Kennedy. 1 Aug 66, 4p
Contract Nonr-1841 (59)
Availability: Published in Journal of Geophysical Research v72 n4 p1393-5 15 Feb 1967.

Descriptors: (*Fluids, Density), Laboratory equipment, Tanks (Containers), Concentration (Chemistry), Sodium chloride.
Identifiers: Stratified media.

The method consists of passing a flat plate (oriented normal to the direction of travel and spanning the width of the tank) and a circular rod (parallel to the plate) through an initially two-layered fluid. By properly adjusting the speed, dimensions, and positions of the plate-rod combination, one can achieve a linear density profile with one pass of the array through the fluid. Sodium chloride was used as the density-biasing agent, so that density (concentration) could be easily determined from conductivity measurements of fluid samples. The gradient of the linear profile was controlled by adjusting the salt concentration of the lower layer of the initially two-layered fluid. (Author)
AD-653 026 Not available from CFSTI.

INTERACTION OF A RING-REINFORCED SHELL AND A FLUID MEDIUM,
Polytechnic Inst of Brooklyn N Y Dept of Aerospace Engineering and Applied Mechanics
Jerry W. Berglund, and Jerome M. Klosner. Jun 67, 53p
PIBAL-935
Contract Nonr-839 (40)

Descriptors: (*Structural shells, Fluid mechanics), (*Stiffened cylinders, Fluid mechanics), Pressure, Interactions, Rings, Acoustics, Series, Numerical analysis, Vibration.

The work is concerned with the transient dynamic response of a periodically ring-reinforced, infinitely long, circular cylindrical shell to a uniform pressure suddenly applied through the surrounding acoustic medium. The incident particle velocity is zero and the rings are assumed to be slightly flexible. A classical theory of the Donnell type is used to analyze the shell while the fluid is described by the linear acoustic field equation. The solution is obtained by assuming a power series expansion in the ring stiffness parameter and utilizing a technique which reduces the transient dynamic problem to an equivalent steady-state formulation. Numerical results are presented for a steel shell immersed in salt water for different ring spacings. For the case of rigid rings, a cylindrical and plane wave approximation was also used to represent the fluid field. It is shown that the cylindrical wave approximation yields reasonably accurate results. Flexible ring results, although limited, indicate that undamped or nonradiating components of the shell vibration are activated. (Author)
AD-653 089 HC$3.00 MF$0.65

HYDRODYNAMIC ASPECTS OF MACROMOLECULAR SOLUTIONS.
Technical rept.,
Hydronautics Inc Laurel Md
Marshall P. Tulin. May 67, 38p Rept no. TR-353-4
Contract Nonr-4181 (00)

Descriptors: (*Solutions, *Hydrodynamics), Molecular properties, Solvents, Fluid dynamic properties, Strain (Mechanics), Stresses, Turbulence, Shear stresses.
Identifiers: Drag-reducing fluids.

The report is an attempt in very brief form to: review some important concepts involving disperse systems (such as thermal forces, entropy, and strain energy); discuss the dynamics of molecular response to the motion of the solvent; introduce and discuss the idea of critical strain rates, which arises naturally in the theory of molecular response; relate molecular strain to fluid stresses through the use of Mohr's Circle; discuss in a speculative way the role of fluid stiffness in turbulent flows, as for example in providing a mode for the extraction of turbulent energy from an eddy through the generation of elastic shear waves. Finally, it is speculated how the possibility for radiation damping may result in a two or three-fold thickening of the viscous sub-layer. (Author)
AD-653 097 HC$3.00 MF$0.65

INERTIAL RANGES IN TWO-DIMENSIONAL TURBULENCE.
Research rept.,
Kraichnan (Robert H) Peterborough N H
Robert H. Kraichnan. Jan 67, 23p Rept no. RR-11
Contract Nonr-4307 (00)

Descriptors: (*Turbulence, *Two-dimensional flow), Kinetic energy, Vortices, Viscosity, Mathematical analysis, Incompressible flow.

Two-dimensional turbulence has both kinetic energy and mean-square vorticity as inviscid constants of motion. Consequently it admits two formal inertial ranges, E (k) is approx. (epsilon to the 2/3 power) k to the -5/3 power and E (k) is approx. (eta to the 2/3 power) k to the -3rd power, where epsilon is the rate of cascade of kinetic energy per unit mass, eta is the rate of cascade of mean-square vorticity, and the kinetic energy per unit mass is the integral from 0 to infinity E (k)dk. The -5/3 range is found to entail backward energy cascade, from higher to lower wavenumbers k, together with zero vorticity flow. The -3 range gives an upward vorticity flow and zero energy flow. The paradox in these results is resolved by the irreducibly triangular nature of the elementary wavenumber-interactions. The formal -3 range gives a nonlocal cascade and consequently must be modified by logarithmic factors. If energy is fed in at a constant rate to a band of wavenumbers approx. k sub i and the Reynolds number is large, it is conjectured that a quasisteady state results with a -5/3 range for k << k sub i and a -3 range for k >> k sub i, up to the viscous cut-off. The total kinetic energy increases steadily with time as the -5/3 range pushes to ever-lower k, until scales the size of the entire fluid are strongly excited. The rate of energy dissipation by viscosity decreases to zero if kinematic viscosity is decreased to zero with other parameters unchanged. (Author)
AD-653 111 HC$3.00 MF$0.65

LAGRANGIAN-HISTORY STATISTICAL THEORY FOR BURGERS' EQUATION.
Research rept.,
Kraichnan (Robert H) Peterborough N H
Robert H. Kraichnan. Jun 67, 39p Rept no. RR-12
Contract Nonr-4307 (00)

Descriptors: (*Shock waves, Statistical analysis), Turbulence, Theory, Approximation (Mathematics), Reynolds number, Pressure, Correlation techniques.
Identifiers: Lagrangian theory, Burgers' equation.

The Lagrangian-history direct-interaction approximation for Burgers' equation yields a 1/ (k sq) inertial-range spectrum and an infinite-Reynolds-num-

ber similarity solution which describes stationary, decaying sawtooth shock waves. This solution differs only by a numerical factor from an exact statistical solution of Burgers' equation into which almost all spatially periodic, zero-mean, infinite-Reynolds-number initial ensembles are expected to evolve. The different inertial-range predictions of the approximation for Burgers' equation and Navier-Stokes dynamics (where k to the -5/3 power results) are directly associated with the effects of pressure-induced accelerations on Langrangian correlation times. (Author)
AD-653 112 HC$3.00 MF$0.65

INITIAL AND BOUNDARY VALUE PROBLEMS IN DISSIPATIVE GAS DYNAMICS,
Brown Univ Providence R I Div of Applied Mathematics
Lawrence Sirovich. 6 Apr 66, 14p
Contract Nonr-562 (39)
Availability: Published in Physics of Fluids v10 n1 p24-34 Jan 1967.

Descriptors: (*Compressible flow, Differential equations), Boundary value problems, Initial value problems, Shock waves, Shock tubes, Sound, Reflection.

The discontinuous forms of the full Navier-Stokes equations are derived. A general method of solving linearized initial and boundary value problems is discussed. The following specific examples are solved: initial value problem in an unbounded domain, shock reflection from an insulating wall, shock evolution in a finite shock tube with insulating walls, and reflection of a sound wave from an isothermal wall. In all cases the dissipative parameters and the gas law are left arbitrary. (Author)
AD-653 121 Not available from CFSTI.

SOME FRICTIONAL PROPERTIES OF THIN WATER FILMS.
Snow Ice and Permafrost Research Establishment Wilmette Ill
For primary bibliographic entry see Field 7D.
AD-653 132 HC$3.00 MF$0.65

THE BLOWHARD PROBLEM--INVISCID FLOWS WITH SURFACE INJECTION,
Rand Corp Santa Monica Calif
J. D. Cole, and J. Aroesty. Apr 67, 50p Rept no. RM-5196-ARPA
Contract DAHC15-67-C-0141

Descriptors: (*Slender bodies, Gas flow), (*Injection, Mass transfer), Hypersonic flow, Supersonic flow, Boundary layer, Viscosity, Surfaces, Incompressible flow.
Identifiers: Blowing.

A simple model is presented for the analysis of inviscid flow fields over slender bodies accompanied by high rates of surface mass transfer. This model assumes a thin, inviscid injectant layer, which is separated from the outer flow by a contact discontinuity. Inviscid boundary-layer equations are shown to be applicable within the injectant layer, and the pressure gradient is found by matching pressure and flow direction at the dividing streamline. Using stream-function variables, an Abel integral equation is derived, and the inverse problem of determining the injection distribution from the shape of the dividing streamline is solved analytically for supersonic and hypersonic flow over flat plates and cone (Author)
AD-653 146 HC$3.00 MF$0.65

SIMILARITY SOLUTIONS FOR THE RETARDED COMPRESSIBLE BOUNDARY LAYER WITH HEAT AND MASS TRANSFER,
Aerospace Research Labs Wright-Patterson AFB Ohio
Karlheinz O. W. Ball. Mar 67, 22p Rept no. ARL-67-0054

Descriptors: (*Laminar boundary layer, *Two-dimensional flow), Mass transfer, Heat transfer, Computer programs, Stagnation point, Shear stresses, Velocity, Enthalpy, Walls, Compressible flow, Kinematics, Viscosity, Separation.

Similarity solutions are presented for the compressible laminar boundary layer with adverse pressure gradients showing the quantitative effect of heat and mass transfer on the wall shear and temperature gradient. Two suction parameters as well as wall temperatures ranging from absolute zero to twice the free-stream stagnation temperature are investigated for numerous adverse pressure gradients.
AD-653 181 HC$3.00 MF$0.65

ENERGY TRANSFER AND ELECTRON CONDUCTION IN THE FLUID TRANSPORTATION ARC.
Columbia Univ New York Electronics Research Labs
For primary bibliographic entry see Field 20H.
AD-653 196 HC$3.00 MF$0.65

CONDENSATION DROPLET GROWTH IN RAREFIED GASES,
Cornell Aeronautical Lab Inc Buffalo N Y
Sang-Wook Kang. Mar 67, 43p Rept no. CAL-AD-1672-A-3
ARL-67-0049
Contract AF 33 (657)-8302

Descriptors: (*Drops, *Condensation), Vapors, Superaerodynamics, Particle size, Kinetic theory, Heat transfer, Mass transfer, Diffusion, Mercury.

An analysis is made of thermal and diffusion effects on the droplet growth phenomena in a supersaturated vapor and inert carrier gas (see also AD-646 669). Two cases are considered: 1) constant fluid conditions, and 2) changing fluid conditions due to condensation effects. The analysis is so formulated as to describe the continuous growth process as the droplet size increases from microscopic (free-molecular) to 'rarefied', even to macroscopic (continuum). Equations for the conservation of mass and energy are derived by application of the 'Langmuir model' in the rarefied ('slip') regime and two correlation parameters for the mass transfer and the energy transfer are introduced for analyzing this regime. Analytic solutions are obtained for the droplet growth with time by expressing the saturation vapor pressure as a linear function of temperature. The results indicate that the choice of these slip-regime parameters influence the droplet growth only when the ratio of the droplet size to the mean free path is of order one. However, when the droplet size is very small or very large compared to the mean free path, the values chosen for these parameters have a negligible effect on the droplet growth. (Author)
AD-653 199 HC$3.00 MF$0.65

FINITE DIFFERENCE SOLUTION OF THE LAMINAR COMPRESSIBLE BOUNDARY LAYER EQUATIONS IN THE VON MISES VARIABLES WITH APPLICATIONS,
New York Univ N Y Dept of Aeronautics and Astronautics
Gdalia Kleinstein. Mar 67, 98p Rept no. NYU-AA-66-56
ARL-67-0050
Contract AF 33 (615)-2215

Descriptors: (*Laminar boundary layer, Equations), Gas flow, Numerical analysis, Series, Numerical methods and procedures, Stagnation point, Aerodynamic slots, Injection, Coolants, Hypersonic flow.
Identifiers: VON Mises relation.

A finite difference solution of the laminar compressible boundary layer equations in the von Mises variables is presented with applications to slot injection. The explicit scheme employed in the numerical method in conjunction with a set of compatibility conditions at the wall provides an accurate and efficient method of solution for the compressible boundary layer. From investigations of the decay of a disturbance in an incompressible zero pressure gradient flow a characteristic length is obtained beyond which local similarity may be taken as fully established independently of the initial velocity profiles. An analysis of the slot injection problem indicates that the pertinent parameters for slot cooling are the mass flow and stagnation temperature of the coolant. The effect of initial profiles must be included in those cases where transition is feasible. (Author)
AD-653 206 HC$3.00 MF$0.65

PRESSURE, BERNOULLI SUM, AND MOMENTUM AND ENERGY RELATIONS IN A LAMINAR ZONE OF SEPARATION.
Iowa Univ Iowa City Inst of Hydraulic Research
For primary bibliographic entry see Field 13G.
AD-653 219 Not available from CFSTI.

COMPUTATIONAL AND EXPERIMENTAL STUDY OF A CAPTIVE ANNULAR EDDY,
Iowa Univ Iowa City Inst of Hydraulic Research
Enzo O. Macagno, and Tin-Kan Hung. 27 Jun 66, 27p
AROD-2981:7
Grant DA-AROD (D)-31-124-G31
Availability: Published in Journal of Fluid Mechanics v28 pt1 p43-64 1967.

Descriptors: (*Fluid flow, *Laminar flow), Reynolds number, Vortices, Fluid dynamic properties, Simulation, Iterations, Differential equations, Navier-Stokes equations.

Results of calculations and experiments on the flow of a viscous liquid through an axisymmetric conduit expansion are reported. The streamlines and vorticity contours are presented as functions of the Reynolds number of the flow. The dynamic interaction between the main flow and the captive eddy between it and the walls is analysed, and it is concluded that, for laminar flow, the main role of the eddy is that of shaping the flow with a rather small energy exchange. (Author)
AD-653 220 Not available from CFSTI.

LAMINAR EDDIES IN A TWO-DIMENSIONAL CONDUIT EXPANSION,
Iowa Univ Iowa City Inst of Hydraulic Research
Tin-Kan Hung, and Enzo O. Macagno. 1966, 13p
AROD-2871:11
Grant DA-ARO (D)-31-124-G174
Summary in French.
Availability: Published in La Houille Blanche n4 p391-401 1966.

Descriptors: (*Laminar flow, Two-dimensional flow), (*Turbulence, Laminar flow), Diffusion, Mathematical analysis, Flow separation, Vortices, Reynolds number.

The results of calculations performed with an electronic computer for the zone of separation in a two-dimensional conduit expansion of ratio 2:1 are presented; flow patterns and vorticity contours are given for Reynolds numbers from zero to 333. Two methods were used, one involving the direct determination of the steady-state solution from equations without unsteady terms, and the other based on approaching the solution asymptotically by numerical integration of the equations with local acceleration terms. For equal conditions, the unsteady approach showed computational stability when the steady approach became unstable; when both methods were stable, the results agreed very well. (Author)
AD-653 227 Not available from CFSTI.

A NEW THEORY OF THE SUPERFLUID VORTEX PHENOMENON,
California Univ San Diego La Jolla Dept of Physics
For primary bibliographic entry see Field 20M.
AD-653 237 Not available from CFSTI.

A MODIFICATION OF THE DIFFERENTIAL APPROXIMATION FOR RADIATIVE TRANSFER,
California Univ San Diego La Jolla
For primary bibliographic entry see Field 20M.
AD-653 242 Not available from CFSTI.

THE POST-NEWTONIAN EFFECTS OF GENERAL RELATIVITY ON THE EQUILIBRIUM OF UNIFORMLY ROTATING BODIES. III. THE DEFORMED FIGURES OF THE JACOBI ELLIPSOIDS. IV. THE ROCHE MODEL,
Chicago Univ Ill
S. Chandrasekhar. 10 Oct 66, 30p
Contract Nonr-2121 (24)
Availability: Published in The Astrophysical Journal v148 p621-49 May 1967.

Descriptors: (*Hydrodynamics, Relativity theory), Sequences, Models (Simulations), Gravity, Fluid flow, Approximation (Mathematics), Stability, Rotation.
Identifiers: Jacobi ellipsoids, Roche model

The effects of general relativity, in the post-Newtonian approximation, on the Jacobian figures of equilibrium of uniformly rotating homogeneous masses are determined. It is shown, for example, that the post-Newtonian figure is obtained by a deformation of the Jacobi ellipsoid by a suitable Lagrangian displacement cubic in the coordinates. The solution of the post-Newtonian equations exhibits an indeterminacy at the point of bifurcation M2, where the Jacobian sequence branches off from the Maclaurin sequence, and a singularity at a point J4, where the axes of the Jacobi ellipsoid are in the ratios 1:0.2972:0.2575. The indeterminacy in the solution at M2 arises from the fact that at this point the Maclaurin spheroid is neutral to an infinitesimal deformation proportional to (x1, -x2, 0); and the singularity at J4 arises from the fact that at this point the Jacobi ellipsoid is unstable to the deformation induced by the effects of general relativity. (Author)
AD-653 251 Not available from CFSTI.

KINETIC MODELS FOR A GAS WITH INTERNAL STRUCTURE,
Brown Univ Providence R I Div of Engineering
F. B. Hanson, and T. F. Morse. 22 Aug 66, 12p
AFOSR-67-1280
Contract AF 49 (638)-1326
Availability: Published in The Physics of Fluids v10 n2 p345-53 Feb 1967.

Descriptors: (*Gases, *Kinetic theory), Mathematical models, Scattering, Distribution functions, Polyatomic molecules, Transport properties, Equations, Gas flow.

Kinetic model equations for a polyatomic gas were obtained by employing a diagonal approximation in the truncation of the linearized operator of the Wang Chang-Uhlenbeck equation. These models possess an H theorem, and a Chapman-Enskog analysis of these equations yields the correct transport coefficients, such as bulk viscosity, viscosity, and thermal conductivity for translational and internal degree of freedom. The restrictions of the Wang Chang-Uhlenbeck equation are discussed, and it is believed that these model equations should be most useful in the study of those kinetic problems involving scalar transport phenomena, in particular, sound propagation, heat transfer, and shock structure. (Author)
AD-653 296 Not available from CFSTI.

EXPANSION OF UNIFORM GAS CLOUDS INTO A VACUUM.
Revised ed.,
Cornell Univ Ithaca N Y
Edward W. Hubbard. 20 Oct 66, 5p
AFOSR-67-1258
Contract AF 49 (638)-1346
Revision of manuscript submitted 8 Aug 66.
Availability: Published in AIAA Journal v5 n2 p378-80 Feb 1967.

Descriptors: (*Gas flow, Vacuum), (*Superaerodynamics, *Jets), Flow fields, Mathematical analysis, Approximation (Mathematics), Boundary layer.

The note discusses the problem of the expansion of uniform gas clouds into a vacuum. The approximate solutions for large time due to Mirels and Mullen, Bauer, and Wedemeyer are examined, and certain inconsistencies concerning the boundary conditions that are placed on these solutions are pointed out. A new approximate solution which satisfies all known conditions is then proposed, and it is compared with the available numerical results. (Author)
AD-653 325 Not available from CFSTI.

THE EQUILIBRIUM OF SLOWLY ROTATING CONFIGURATIONS IN THE POST-NEWTONIAN APPROXIMATION: CORRECTIONS TO CLAIRAUT'S EQUATION; THE APPEARANCE OF A ROTATING CONFIGURATION AS VIEWED FROM INFINITY.
Doctoral thesis,
Chicago Univ Ill
Elliott Krefetz. 3 Nov 66, 33p
Contract Nonr-2121 (24)
Revision of manuscript submitted 10 Aug 66.
Availability: Published in Astrophysical Journal v148 p589-620 May 1967.

Descriptors: (*Hydrodynamics, Relativity theory), Equations of motion, Fluid flow, Theses, Differential equations, Rotation, Spheres, Approximation (Mathematics).
Identifiers: Clairaut equation.

The post-Newtonian effects on the equilibrium of a slowly uniformly rotating fluid with symmetry about the axis of rotation and under stationary conditions are examined. The problem is formulated, successively, in terms of an effective potential, the equations of motion, and a variational principle. All three approaches yield the same generalization of Clairaut's equation. (Author)
AD-653 376 Not available from CFSTI.

DRAG OF AN OBJECT IN NEARLY-FREE MOLECULAR FLOW.
Revised ed.,
New York Univ N Y Courant Inst of Mathematical Sciences
Marian H. Rose. 22 May 64, 9p
AFOSR-67-1248
Grant AF-AFOSR-62-266
Revision of manuscript received 9 Dec 63.
Availability: Published in Physics of Fluids v7 n8 p1262-9 Aug 1964.

Descriptors: (*Superaerodynamics, *Drag), Distribution functions, Aerodynamic configurations, Spheres, Mach number, Flight, Interactions.

In the nearly-free molecular flight of a body through a neutral gas the departure from free-flow conditions becomes marked within roughly the distance of a mean free path from the body. This is the region to be studied here. In order to do this as simply as possible, the distribution function for the gas is assumed to be governed by the Krook equation with the addition of a point source term; this term is identified with the radial flow issuing from the object and is easily related to its shape and to the boundary condition both at its surface and at infinity. The Krook equation may be linearized about the distribution function at infinity and then solved using Fourier transform techniques. The knowledge thus obtained of the distribution function near the body leads to the expression for the first order perturbation of the drag over its free-molecular value. This is the exact first-order solution in the sense that all collisions between particles are taken into account and not merely 'first collisions.' The case of a sphere undergoing diffuse reflection at high Mach number is worked out in detail and an explicit expression for the drag is derived. (Author)
AD-653 384 Not available from CFSTI.

STABILITY OF AXISYMMETRIC FIGURES OF EQUILIBRIUM OF A ROTATING CHARGED LIQUID DROP,
Chicago Univ Ill Dept of Physics
For primary bibliographic entry see Field 3B.
AD-653 395 Not available from CFSTI.

ORBITAL INVESTIGATION OF PROPELLANT DYNAMICS IN A LARGE ROCKET BOOSTER.
National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
For primary bibliographic entry see Field 22D.
For abstract, see STAR 05 14.
N67-26546 HC$3.00 MF$0.65

SLOSH DYNAMICS STUDY IN NEAR ZERO GRAVITY - DESCRIPTION OF VEHICLE AND SPACECRAFT.
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
For primary bibliographic entry see Field 22D.
For abstract, see STAR 05 14.
N67-26547 HC$3.00 MF$0.65

EFFECTS OF COMBINED BUOYANCY AND SHEAR ON WEAK HOMOGENEOUS TURBULENCE.
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
R. G. Deissler. May 67, 29p NASA-TN-D-3999
Contract 129-01-09-07-22

Descriptors: *Buoyancy, *Homogeneous turbulence, *Initial value problem, *Shear flow, Continuity, Correlation, Energy, Equation, Flow, Fluctuation, Gradient, Homogeneity, Initial, Navier-stokes equation, Problem, Shear, Spectrum, Turbulence, Value, Velocity, Weak.

For abstract, see STAR 05 14.
N67-26553 HC$3.00 MF$0.65

SMALL AMPLITUDE LATERAL SLOSHING IN A CYLINDRICAL TANK WITH A HEMISPHERICAL BOTTOM UNDER LOW GRAVITATIONAL CONDITIONS SUMMARY REPORT.
Lockheed Missiles and Space Co., Sunnyvale, Calif.
P. Concus, G. E. Crane, and H. M. Satterlee. 20 Jan 67, 128p NASA-CR-54700, LMSC/A852007
Contract NAS3-7119

Descriptors: *Cylindrical tank, *Gravitational effect, *Hemisphere cylinder body, *Liquid sloshing, Acceleration, Amplitude, Angle, Body, Bottom, Contact, Cylinder, Difference, Effect, Frequency, Gravitational, Hemisphere, Iteration, Lateral, Liquid, Low gravity, Mesh, Periodic, Pulse, Reduction, Sinusoid, Sloshing, Small, Square, Tank, Triangle, Volume, Wave.

For abstract, see STAR 05 14.
N67-26584 HC$3.00 MF$0.65

LOW GRAVITY LIQUID SLOSHING IN AN ARBITRARY AXISYMMETRIC TANK PERFORMING TRANSLATIONAL OSCILLATIONS.

Southwest Research Inst., San Antonio, Tex. Dept. of Mechanical Sciences.
W.-H. Chu. 20 Mar 67, 41p NASA-CR-84404, TR-4
Contract NAS8-20290

Descriptors: *Axisymmetric body, *Fuel tank, *Liquid sloshing, *Translational motion, Arbitrary, Axisymmetry, Body, Characteristic, Force, Fuel, Function, Liquid, Low gravity, Mechanical, Model, Moment, Motion, Oscillation, Sloshing, Tank, Translation.

For abstract, see STAR 05 14.
N67-27363 HC$3.00 MF$0.65

LAMINAR BOUNDARY LAYER ON BLUNT BODIES, ALLOWING FOR VORTICITY OF THE EXTERNAL STREAM.
Laminarnyy Pogranichnyy Sloy Na Zatuplennykh Telakh S Uchetom Zavikhrennosti Vneshnego Potoka
National Aeronautics and Space Administration, Washington, D. C.
I. N. Murzinov. Jun 67, 10p NASA-TT-F-11007
Transl. Into English From Izv. Akad. Nauk Sssr, Mekhan. Zhidkosti I Gaza (USSR), No. 6, 1966 P 124-129

Descriptors: *Blunt body, *Bow wave, *Laminar boundary layer, *Vortex flow, Angle, Blunt, Body, Boundary, Bow, Calculation, Cone, Curve, Density, External, Flow, Friction, Hypersonic, Laminar, Layer, Nose, Ratio, Velocity, Vortex, Wave.

For abstract, see STAR 05 14.
N67-27536 HC$3.00 MF$0.65

THE FILTRATION OF AEROSOLS BY GLASS FIBRE FILTERS. I - INFLUENCE OF THE AEROSOL PARTICLE SIZE AND THE LINEAR FLOW VELOCITY.
de Filtratie Van Aerosolen Door Glasvezelfilters. I - Invloed Van Deeltjes- Grootte en Doovoersnelheid
Chemical Lab. RVO-TNO, Rijswijk (Netherlands).
L. A. Clarenburg, and J. F. Van Der Wal. Feb 67, 21p TDCK-47902, REPT.-1967-4
in Dutch, English Summary

Descriptors: *Aerosol, *Filtration, *Flow velocity, *Glass fiber, *Particle size, *Phthalate, Chloride, Diameter, Dibutyl, Fiber, Flow, Glass, Linear, Particle, Penetration, Size, Sodium, Test, Velocity.

For abstract, see STAR 05 14.
N67-27552 HC$3.00 MF$0.65

INVESTIGATION INTO THE PROPELLER CAVITATION IN OBLIQUE FLOW.
Mitsubishi Heavy-industries, Ltd., Nagasaki (Japan).
Mar 67, 8p
Contract NONR-5002/00/
Its Tech. Bull.-45

Descriptors: *Cavitation, *Flow equation, *Propeller, *Supercavitation, Calculation, Characteristics, Equation, Flow, Oblique, Quasi-steady, Testing, Validity.

For abstract, see STAR 05 14.
N67-27775 HC$3.00 MF$0.65

CAVITATION DAMAGE AND CORRELATIONS WITH MATERIAL AND FLUID PROPERTIES,
Michigan Univ., Ann Arbor. Dept. of Nuclear Engineering.
R. Garcia, and F. G. Hammitt. Sep 66, 58p Rept. no. 05031-11-1
Grant NSF-G-22529

Descriptors: (*Cavitation, Damage), (*Erosion, Cavitation), Metals, Alloys, Glass textiles, Experimental data, Ultrasonic radiation, Water, Liquid metals.

A comprehensive set of cavitation damage data has been obtained in a vibratory facility using water, mercury, lithium, and lead-bismuth alloy as test fluids, and covering temperatures ranging from room temperature to 1500F. Materials tested include a wide variety of metals and alloys. From this data a simple, reasonably precise, damage predicting equation has been derived, including only ultimate resilience as a material property, but also corrections for cavitation 'thermodynamic effects' and NPSH. It has been found that of the conventional mechanical properties, ultimate resilience is the most successful in this regard. A direct comparison between venturi and vibratory cavitation damnge shows that the relative rankings of materials remains about the same for mercury, and a good correlation is obtained between the mercury data from the venturi and ultimate resilience. Neither statement applies for the water venturi data, possibly because of the greater effects of corrosion in the low intensity cavitation field. (Author)
PB-173 464 HC$3.00 MF$0.50

THE RESOLUTION OF TURBULENT PRESSURES AT THE WALL OF A BOUNDARY LAYER,
California Univ., Berkeley. Div. of Aeronautical Sciences.
G. M. Corcos. Sep 66, 49p AS-66-13
Grant NSF-GP-2520

Descriptors: (*Turbulent boundary layer, Piezoelectric transducers), Pressure, Attenuation, Equations of motion, Fluid flow, Density, Frequency, Separation, Sonar.

In the first part of this report the asymptotic resolution by a large piezo-electric transducer of local turbulent pressure fluctuations is given for a sensing face of arbitrary shape and spatial sensitivity distribution. The main result is that under circumstances which are perhaps unrealistically stringent the attenuation of a given frequency component will increase as the inverse cube of the transducer face linear dimension. In general it should be expected to increase only as the inverse square of the dimension. The attenuation of smaller transducers is governed by the dependence of the pressure cross-spectral density upon frequency and separation distances. In the second part of the report, the nature of this dependence is discussed at length. New measurements of the cross-spectral density for small separations and large frequencies are discussed. These as well as previous experiments and physical reasoning support the idea that the characteristic time and length scales of the cross-spectral density are internal and therefore strongly coupled. Two experimental determinations of the resolution of small transducers are examined and compared with theoretical predictions given in an earlier paper. It is found that one set of data taken at comparatively low frequencies supports the theory; the other deviates markedly from the theory and suggests that the resolution improves as the frequency increases beyond a certain value. Possible reasons for such an anomalous result are suggested.
PB-173 596 HC$3.00 MF$0.65

EDGE-TONE GENERATION,
Stanford Univ., Calif. Dept. of Aeronautics and Astronautics.
Krishnaumurty Karamcheti, and Andrew Burkhard Bauer. Jul 63, 83p SUDAER-162
Research supported in part by NSF.

Descriptors: (*Hydrodynamics, *Sound), (*Fluid dynamic properties, Turbulence), Velocity, Fluctuating components, Fluidics, Measurement, Fluid flow, Jets, Anemometers, Control systems.

The report contains an experimental study of some of the physical factors underlying the generation of edge tones. The edge tone is a problem in the general field of aerodynamic or hydrodynamic sound generation. By 'hydrodynamic sound' one means the sound fields produced by fluid motion without the movement of solid surfaces. The problem includes sound generated by turbulence, by jets, by vortex motion, by boundary layers, by free shear layers, and by heat release. Because of its great importance in both warfare and the commercial usage of ships and aircraft, hydrodynamic sound has received widespread interest in recent years. (Author)
PB-173 942 HC$3.00 MF$0.65

20E. MASERS AND LASERS

LASER OSCILLATION IN ATOMIC Cl IN HCl GAS DISCHARGES,
Trg Inc Melville N Y
S. M. Jarrett, J. Nunez, and G. Gould. 27 Jan 66, 4p
AFOSR-67-1124
Contract AF 49 (638)-1535, ARPA Order-356
Availability: Published in Applied Physics Letters v8 n6 p150-1 Mar 15 1966.

Descriptors: (*Lasers, Chlorine), (*Chlorine, Emissivity), Hydrochloric acid, Gas discharges, Gas lasers, Electron transitions, Infrared radiation, Iodine, Atomic energy levels.

The observation of CW infrared laser oscillation in neutral atomic Br and I produced in an ac glow discharge in the hydrogen halides HBr and HI was previously reported. The investigation was extended through use of high-current, pulsed discharges to include HCl, a more tightly bound hydrogen halide. The results are observation of three new 3d to 4p laser transitions in Cl similar to those previously observed in Br and I and clarification of the excitation mechanism in previously reported laser transitions in Cl. Reexamination of HI discharges led to observation of two new d to p transitions in I.
AD-652 749 Not available from CFSTI.

STUDY - FAR INFRARED GENERATOR.
Perkin-Elmer Corp Norwalk Conn Electro-Optical Div
For primary bibliographic entry see Field 20F.
AD-652 830 HC$3.00 MF$0.65

HIGH POWER GAS LASER RESEARCH.
Final rept., 15 Mar 66-14 Jan 67,
Raytheon Co Waltham Mass Research Div
David R. Whitehouse. Jun 67, 120p Rept no. S-940
Contract DA-01-021-AMC-12427 (Z)
See also AD-627 023.

Descriptors: (*Gas lasers, Optimization), Carbon dioxide, Nitrogen, Helium, Excitation, Electric discharges, Gas flow, Gain, Heat transfer, Gas ionization, Recombination reactions, Plasma medium, Infrared optical systems.

The report concerns the investigation and optimization of high power and high efficiency in the cw gas laser utilizing carbon dioxide, nitrogen and helium as the active laser medium. In all cases, the gases are excited by an electrical discharge. In the area of flowing gas lasers, an experimental investigation was made into the unsaturated gain characteristics at 10.6 microns and their dependence on the tube diameter, gas mixing, and flow speed. The measurements were taken with a laser bridge of sufficient resolution to measure the radial profiles of the gain. For the high-power oscillators, determination was made of the dependence of the power on tube length, gas pressure, pumping speed, output coupling, and mode control. For

sealed-off lasers, determination was made of the dependence of the output power on the gas mix, pressure, and tube preparation. Some results on the initial phases of long life tests are also included. Much of the data which was accumulated indicates that the present limitations of output power in large bore tubes and sealed-off tubes stem from the heating of the gas by the discharge. This is corroborated by theoretical calculations of the heat transfer and temperature profile in the tube. (Author)
AD-653 031 HC$3.00 MF$0.65

FAR-INFRARED LASER POWER MEASUREMENTS.
Massachusetts Inst of Tech Cambridge National Magnet Lab
F. Arams, C. Allen, M. Wang, K. Button, and L. Rubin. 12 Dec 66, 2p
AFOSR-67-1186
Contracts AF 49 (638)-1468, NAS12-6
Prepared in cooperation with Cutler-Hammer, Inc., Melville, N. Y., Airborne Instruments Lab.
Availability: Published in Proceedings of the IEEE v55 n3 p420 Mar 1967.

Descriptors: (*Lasers, *Infrared spectroscopy), High frequency, Instrumentation, Cyanides, Detectors, Prisms (Optics), Bolometers, Helium, Attenuators, Waveguides, Power equipment.

Measurements of the peak and average output power of a 337-micron cyanide laser are reported. The tests served to indicate the usefulness at this high frequency of available oversize-waveguide instrumentation--a room-temperature average-power measuring bolometer, a liquid helium-colled InSb detector-mixer and a double-prism attenuator. (Author)
AD-653 046 Not available from CFSTI.

ACTIVE DISTORTION DURING RUBY LASER ACTION.
Technical rept.,
Minnesota Univ Minneapolis Dept of Electrical Engineering
Mylan Radulovich, and R. J. Collins. Apr 67, 58p Rept no. TR-5
Contract Nonr-710 (61)

Descriptors: (*Lasers, Distortion), (*Ruby, Thermal stresses), Pumping (Optical), Thermal properties, Optical properties, Thermal conductivity, Interferometers, Heating, Thermal expansion, Refractive index.

Ruby laser rods were studied with respect to thermal distortions induced by the excitation pump flash. Nonuniform temperature distributions cause optical distortions and prevent the laser beam from realizing its minimum theoretical width (diffraction limit). These variations result from the radial distribution of absorbed energy. The radial gradients produce changes in the index of refraction and optical path length which lead to a lens type behavior by the ruby rod. More uniform pumping would reduce the temperature distributions and consequently diminish this lens effect. (Author)
AD-653 060 HC$3.00 MF$0.65

OPTICAL INHOMOGENEITIES IN PUMPED LASERS, VOLUME I.
Final rept., 1 May 65-31 Oct 66,
American Optical Co Southbridge Mass Research Div
Charles J. Koester. May 67, 108p
Contract Nonr-4875 (00), ARPA Order-306

Descriptors: (*Lasers, Distortion), Optical glass, Thermal properties, Thermal stresses, Thermal expansion, Pumping (Optical), Refractive index, Thermal stability, Rods, Disks, Photoelasticity.

The report delineates efforts expended on a project which required an analysis in depth of thermal distortion of wavefronts in large laser rods and discs. Two approaches for elimination of this distortion were considered: (1) establishment of a uniform temperature throughout the laser during pumping and (2) development of athermal glass parameters. Elements of both approaches were found necessary to solve the problem. In separate sections of the report detailed treatments are given to thermally stable cavities, temperature profile calculations, the effect of the laser field on index of refraction of the laser rod, and finally an analysis of end region stress. (Author)
AD-653 069 HC$3.00 MF$0.65

A STUDY IN ADP OF SPONTANEOUS PARAMETRIC INTERACTION TUNEABLE FROM 4400A TO 16000A.
Cornell Univ Ithaca N Y Materials Science Center
For primary bibliographic entry see Field 20F.
AD-653 091 Not available from CFSTI.

STUDY OF FUNDAMENTAL REQUIREMENTS FOR HIGH BRIGHTNESS RAMAN LASER SOURCES.
Hughes Research Labs Malibu Calif
For primary bibliographic entry see Field 7D.
AD-653 106 HC$3.00 MF$0.65

LASER IMPULSE MEASUREMENTS WITH ELECTRONIC DETECTION SYSTEM.
Technical note,
Ballistic Research Labs Aberdeen Proving Ground Md
Millan D. Stoller. Apr 67, 16p Rept no. BRL-TN-1651

Descriptors: (*Lasers, *Measurement), (*Detection, *Electronic equipment), Operation, Photodiodes, Semiconductors, Light, Electrical properties, Transistor amplifiers, Gain, Analysis, Tests.

An electronic device to determine the swing of a ballistic pendulum when the pendulum is struck by laser radiation is described and its operation analyzed. (Author)
AD-653 139 HC$3.00 MF$0.65

THE VOLATILE RARE EARTH CHELATES OF 1, 1, 1, 2, 2, 3, 3 - HEPTAFLUORO - 7, 7 - DIMETHYL - 4, 6 - OCTANEDIONE.
Aerospace Research Labs Wright-Patterson AFB Ohio
For primary bibliographic entry see Field 7B.
AD-653 183 HC$3.00 MF$0.65

CHARACTERISTICS OF THE STOKES EMISSION IN THE STIMULATED BRILLOUIN SCATTERING PROCESS,
Cornell Univ Ithaca N Y School of Electrical Engineering
For primary bibliographic entry see Field 20F.
AD-653 210 HC$3.00 MF$0.65

TEMPORAL COHERENCE AND FREQUENCY VS TIME CHARACTERISTICS OF A Q-SPOILED RUBY LASER,
Cornell Univ Ithaca N Y School of Electrical Engineering
G. J. Wolga. 30 Oct 66, 93p Rept no. Scientific-2
AFCRL-67-0052
Contract AF 19 (628)-5677

Descriptors: (*Lasers, *Ruby), Q meters, Time, Diffraction analysis, Excitation, Ions, Coherent radiation, Interferometers, Theory, Design, Atomic properties, Selection, Control, Equations, Tables, Power, Measurement, Absorption, Density, Mirrors, Frequency.

A mode selected, cryptocyanine Q-switched ruby laser was designed, constructed, and operated. The degree of mode selectivity as a function of cryptocyanine loss was studied and an optimum loss was selected. Theoretical work was done to incorporate the cryptocyanine loss into a theory of passively Q-switched lasers. A transient interference experiment was redesigned for operation with a Q-spoiled laser. Data was obtained showing that the rate of change of the laser frequency during the Q-spoiled emission pulse is approximately twenty times the rate of change during a single spike of an ordinary ruby laser. This result tends to confirm a previously stated model for this frequency change which attributes it to direct atomic coupling to lattice strain. The ions are expected to act independently in causing the strain and hence the variation in cavity optical length is expected to be linear in the change in the number of excited states in the laser. Since the rate of change of population inversion during Q-spoiled emission is much larger than for normal lasing it was expected, prior to this work, that a greater rate of change of frequency should be observed. This has now been confirmed. (Author)
AD-653 213 HC$3.00 MF$0.65

OPTICAL INTERACTIONS IN RUBY LASERS.
Final rept., 1 Dec 65-31 Nov 66,
General Dynamics/Electronics Rochester N Y
Fred C. Unterleitner, and Ying C. Kiang. 28 Feb 67, 70p
AFCRL-67-0194
Contract AF 19 (628)-5810

Descriptors: (*Lasers, Efficiency), (*Pumping (Optical), Efficiency), (*Ruby, Excitation), Atomic energy levels, Emissivity, Ground state, Absorption spectrum, Probability, Photomultipliers, Calibration, Polarization, Heating, Flash lamps, Gas lasers, Krypton.
Identifiers: Ion lasers.

The report concerns the initial stages of an investigation into the efficiency of ruby lasers, and the kinetics of energy level populations generated by optical pumping. The work described includes the calibration of absolute spectral responre of photodetectors, the measurement of ground state absorption cross sections, and the metastable state absorption cross section at selected wavelengths; also described are the preliminary experiments involving end pumping by ion laser radiation at 5682 A. Efficiency measurements at high metastable state populations could not be made with the ion laser power levels available. Calculations based on the absorption measurements, however, indicate a strong wavelength and polarization dependence of overall pumping efficiency in ruby lasers, with metastable state absorption playing an important role in heat input to ruby during pumping. The effectiveness of high pressure mercury discharges for cw pumping is clarified by this analysis. (Author)
AD-653 218 HC$3.00 MF$0.65

SPECTROMETER SYSTEM FOR STUDYING ABSORPTION FROM EXCITED METASTABLE STATES OF IONS IN CRYSTALS,
Naples Univ (Italy) Istituto Di Meccanica Delle Macchine
For primary bibliographic entry see Field 20F.
AD-653 244 Not available from CFSTI.

SELF-LOCKING OF MODES IN THE ARGON ION LASER,
Illinois Univ Urbana Dept of Electrical Engineering
O. L. Gaddy, and E. M. Shaefer. 8 Sep 66, 5p
AFOSR-67-1277
Grant AF-AFOSR-390-65
Availability: Published in Applied Physics Letters v9 n8 p281-2 Oct 15 1966.

Descriptors: (*Gas lasers, Resonance), Argon, Ions, Electromagnetic pulses, Measurement.
Identifiers: Ion lasers, Self-mode locking.

Direct observation of indications of self-mode-locking in the argon ion lnser is reported. With losses introduced into the optical resonator, subnanosecond pulsation of the laser output was observed with a wide-band photomultiplier. (Author)
AD-653 257 Not available from CFSTI.

CUBIC CRYSTAL-FIELD ENERGY LEVELS, Tb(3+):CaF2(1),
Army Electronics Command Fort Monmouth N J Inst for Exploratory Research
For primary bibliographic entry see Field 20L.
AD-653 333 Not available from CFSTI.

FURTHER INVESTIGATIONS WITH AN OPTICAL BEAM WAVEGUIDE FOR LONG DISTANCE TRANSMISSION.
Revised ed.,
Army Electronics Command Fort Monmouth N J Inst for Exploratory Research
J. R. Christian, Georg Goubau, and James W. Mink. 7 Dec 66, 4p
Revision of manuscript submitted 10 Oct 66. Presented at the USRI Spring Meeting, Washington, D. C., 1966.
Availability: Published in IEEE Transactions on Microwave Theory and Techniques vMTT15 n4 p216-9 Apr 1967.

Descriptors: (*Optics, *Lasers), (*Light transmission, *Waveguides), Intensity, Quartz, Reflection, Scattering, Lenses, Pressure, Air, Photometers, Optical properties.

Measurement made with an optical beam waveguide employing quartz lenses for the beam iteration demonstrate that a transmission loss of 0.5 dB/km is readily obtainable, and that this loss is solely determined by the absorption, scatter, and reflection losses of the lenses. The transmission loss and its variation depends on the air pressure along the light path. Photometric measurements of the energy distribution of the transmitted beam illustrate that distortions in the mode pattern of the laser are the major cause of the launching loss which for the available laser was measured to be approximately 0.4 dB. (Author)
AD-653 334 Not available from CFSTI.

METHOD FOR LASER-BEAM CLEANING,
Army Electronics Command Fort Monmouth N J Inst for Exploratory Research
J. R. Christian, and J. W. Mink. 27 Jan 67, 2p
Availability: Published in Electronics Letters v3 n4 Feb 1967.

Descriptors: (*Lasers, *Resonators), Intensity, Mirrors, Lenses, Scattering, Filters (Electromagnetic wave), Mathematical analysis, Equations, Design.

A simple method for removing irregularities in laser output-intensity distributions caused by internal reflections in the output mirror is described. The design equations for a lens and iris combination are given, and experimental results for one type of laser are shown. (Author)
AD-653 337 Not available from CFSTI.

AUTOMATIC TUNING OF HYDROGEN MASERS,
Army Electronics Command Fort Monmouth N J Electronic Components Lab
H. Hellwig, and E. Pannaci. 18 Jan 67, 2p
Availability: Published in Proceedings of the IEEE v55 n4 p551-2 Apr 1967.

Descriptors: (*Masers, *Tuning devices), Hydrogen, Gas discharges, Radiofrequency, Modulation, Automatic, Molecular beams, Line spectrum, Frequency synthesizers, Standards, Stabilization.
Identifiers: Frequency standards.

Beam-intensity modulation based on varying the power of the hydrogen RF-discharge was used in an automatic tuning system. Two hydrogen masers were tuned automatically and simultaneously. Their beat frequency was measured to have a long-term stability of 3 x 10 to the -13th power. (Author)
AD-653 343 Not available from CFSTI.

EXTREMELY SMALL AND SIMPLE PULSE GENERATOR FOR INJECTION LASERS,
Revised ed.,
Army Electronics Labs Fort Monmouth N J
Walter Koechner. 26 Sep 66, 4p
Revision of manuscript received 12 Aug 66.
Availability: Published in Review of Scientific Instruments v38 n1 p17-20 Jan 1967.

Descriptors: (*Pulse generators, *Lasers), Optical equipment, Diodes, Voltage, Resistance (Electrical), Oscillators, Cathodes, Light, Temperature, Lenses, Current regulators, Resistors, Capacitors, Pulse height analyzers, Theory.

A pulse generator is described for pulsing high power injection lasers at room temperature. The outstanding features of this pulser are the small size, cheapness, and simplicity, combined with the capability of switching several thousand amperes. However, the pulse repetition rate is limited to about 500 pulses/sec. The pulser may be used in optical systems where higher repetition rates are not necessary. Although this pulser was developed for pulsing injection lasers, it can also be used for all applications in need of high power pulses combined with the small size of the pulse generator. (Author)
AD-653 344 Not available from CFSTI.

HIGH POWER AND EFFICIENCY IN CdS ELECTRON BEAM PUMPED LASERS,
Massachusetts Inst of Tech Lexington Lincoln Lab
C. E. Hurwitz. 9 Nov 66, 5p Rept no. JA-2932
ESD-TR-67-261
Contract AF 19(628)-5167
Availability: Published in Applied Physicr Letters v9 n12 p420-2 Dec 15 1966.

Descriptors: (*Semiconductor devices, Lasers), (*Cadmium sulfides, *Lasers), Pumping (Electronics), Electron beams, Crystal growth, Emissivity, Infrared radiation, Power, Efficiency, Crystal structure.
Identifiers: Semiconductor lasers.

Electron beam excitation of CdS crystals grown in an atmosphere of excess Cd resulted in laser emission near 4900 A with 350 W of peak output power and 26.5% overall (35% internal) power efficiency at temperatures as high as 110K. Laser action was observed, although at considerably reduced levels of power and efficiency, at temperatures up to 250K. The high performance of the lasers appears to be due to increased crystal uniformity and to the introduction or enhancement of highly efficient radiative transitions, both of which result from the Cd-rich growth conditions. (Author)
AD-653 364 Not available from CFSTI.

DIODE LASERS OF Pb (1-y)Sn (y)Se AND Pb (1-x)Sn (x)Te,
Massachusetts Inst of Tech Lexington Lincoln Lab
J. F. Butler, A. R. Calawa, and T. C. Harman. 3 Nov 66, 4p Rept no. JA-2923
ESD-TR-67-259
Contract AF 19(628)-5167
Availability: Published in Applied Physics Letters v9 n12 p427-9 Dec 15 1966.

Descriptors: (*Semiconductor devices, Lasers), (*Lead alloys, *Lasers), (*Tin alloys, Lasers), (*Selenides, Lasers), (*Tellurides, Lasers), Solid solutions, Band theory of solids, Emissivity, Infrared radiation, Diodes (Semiconductor).
Identifiers: Lead stannoselenides, Lead stannotellurides, Semiconductor (Lasers).

Infrared laser emission at a number of wavelengths between 9.4 microns and 13.7 microns was obtained from diodes of Pb (1-y)Sn (y)Se and Pb (1-x)Sn (x)Te at 12K and 77K. Diodes were fabricated from vapor-grown Pb (1-y)Sn (y)Se and both vapor-grown and Bridgman-grown Pb (1-x)Sn (x)Te. Emission data indicate that, as in Pb (1-x)Sn (x)Te, the energy gap in Pb (1-y)Sn (y)Se decreases with increasing Sn concentration, becoming zero at 12K for some value of y within the range 0.11 < or = y < or = 0.14. (Author)
AD-653 367 Not available from CFSTI.

UNUSUAL CRYSTAL-FIELD ENERGY LEVELS AND EFFICIENT LASER PROPERTIES OF YVO4:Nd.
Revised ed.,
Massachusetts Inst of Tech Lexington Lincoln Lab
J. R. O'Connor. 2 Nov 66, 4p Rept no. JA-2857
ESD-TR-67-176
Contract AF 19(628)-5167
Revision of manuscript submitted 16 Sep 66.
Availability: Published in Applied Physics Letters v9 n11 p407-9 Dec 1 1966.

Descriptors: (*Lasers, Materials), (*Neodymium, *Atomic energy levels), (*Yttrium compounds, Lasers), (*Vanadates, Lasers), Single crystals, Garnet, Doping, Crystal growth, Absorption spectrum, Stark effect, Crystal lattices, Symmetry (Crystallography), Wave functions.
Identifiers: Yttrium vanadate.

The spectral properties of Nd-doped YVO4, grown from the melt, were determined. In absorption the Stark split levels are reduced in comparison to other Nd-doped materials. The Nd ion appears to be in a cubic crystal field even though it substitutes for Y. The reduced Stark splitting, caused by an admixture of 4f and 5d wave functions, leads to efficient, low-threshold laser action. Transfer of energy from the lattice to Nd ions is also observed. (Author)
AD-653 372 Not available from CFSTI.

NARROW BAND OPTICAL HETERODYNE DETECTION.
Arizona Univ., Tucson.
J. Hanlon, and S. F. Jacobs. Jan 67, 14p NASA-CR-84149, TR-12
Sponsored in Part By Nasa

Descriptors: *Detection, *Optical heterodyne, Bandwidth, Coherent, Feedback, Heterodyne, Laser, Light, Low power, Optical, Oscillator, Radiation, Receiver, Signal.

For abstract, see STAR 05 14.
N67-26515 HC$3.00 MF$0.65

LASER MODULATION USING LINEAR ELECTRO-OPTIC CRYSTALS.
Weapons Research Establishment, Salisbury (Australia). Dept. of Supply.
J. R. Pyle. Dec 66, 40p WRE-TN-PAD-125

Descriptors: *Crystal structure, *Electron optics, *Laser mode, Beam, Configuration, Crystal, Effect, Electron, Helium, Laser, Linearity, Mode, Modulation, Multiple, Neon, Optics, Sensitivity, Structure, Television, Transmission, Voltage.

For abstract, see STAR 05 14.
N67-27128 HC$3.00 MF$0.65

ABSOLUTE FREQUENCY MEASUREMENT OF THE 190MU AND 194MU GAS LASER TRANSITIONS.

Massachusetts Inst. of Tech., Cambridge. Dept. of Physics.
L. O. Hocker, A. Javan, and D. R. Rao. 1967, 5p
NASA-CR-84506
Grant NSG-330

Descriptors: *Frequency measurement, *Gas laser, *Submillimeter wave, Absolute, Carbon, Compound, Deuterium, Discharge, Frequency, Gas, Harmonic, Klystron, Laser, Measurement, Mixing, Nitrogen, Oxide, Submillimeter, V-band, Wave.

For abstract, see STAR 05 14.
N67-27669 HC$3.00 MF$0.65

20F. OPTICS

LARGE-AREA ELECTRONIC DISPLAY PANEL.
General Electric Co., Syracuse, N. Y.
For primary bibliographic entry see Field 9A.
AD-451 545 HC$3.00

AN EVALUATION OF A NEW RETICLE DESIGN SYSTEM FOR GUNLAYING AGAINST FLASHES.
George Washington Univ., Alexandria, Va. Human Resources Research Office.
For primary bibliographic entry see Field 19E.
AD-455 070 HC$3.00

CIRCULAR POLARIZATION OF VACUUM ULTRAVIOLET LIGHT BY PIEZOBIREFRINGENCE,
Brown Univ Providence R I
Harold Metcalf, and James C. Baird. 15 Sep 65, 5p
Grant NSF-GP-5125
Availability: Published in Applied Optics v5 n9 p1407-10 Sep 1966.

Descriptors: (*Optical equipment, Polarization), (*Ultraviolet equipment, *Polarization), Birefringence, Vacuum, Lithium fluorides, Refractive index, Experimental design.

An instrument has been constructed that can produce any degree of elliptical polarization from linear to circular in the vacuum uv range 1050 A to 1450 A using a piezobirefringent retarder of LiF. The apparatus is conveniently described by the Mueller matrices. One of the piezobirefringence constants, p11 - p12, ranged from 4.0-10.0 x 10 to the 13th power cm2/dyn for various samples of LiF, and the index of refraction at 1216 A was 1.79 plus or minus 0.14.
AD-652 741 Not available from CFSTI.

100 kHz HOMODYNE, 35 GHz REFLECTION-CAVITY SPECTROMETER WITH PHASE-LOCK OF THE REFERENCE SIGNAL AND LOW FREQUENCY FIELD MODULATION,
Massachusetts Inst of Tech Cambridge National Magnet Lab
H. C. Praddaude. 28 Oct 66, 10p
AFOSR-67-1136
Contract AF 49 (638)-1468
Availability: Published in The Review of Scientific Instruments v38 n3 p339-47 Mar 1967.

Descriptors: (*Spectrometers, K band), Microwave equipment, Modulators, Phase shifters, Phase-locked systems, Ferromagnetic materials, Ferrites.

A 35 GHz, reflection-cavity type microwave spectrometer is described. We use a 35 GHz ferrite modulator in the signal arm to produce a double sideband (plus or minus 100 kHz) suppressed carrier signal to reduce the 1/f microwave crystal noise. Solid metal cavities and low frequency modulation of the externally applied magnetic field are used to reduce leakage from the cavity, thereby reducing susceptibility to microphonics and allowing more freedom in the choice of cavity modes suitable for a wide variety of experiments with metallic or dielectric samples. This instrument employs a 35 GHz ferrite phase shifter to phase lock the microwave signal in the reference arm of the bridge for observation of absorption signals. An analogous scheme for phase-locking at dispersion signals is also suggested. A narrow passband, low noise, active filter, with a Q factor of approximately 1000,000, is used as part of a feedback loop around the 100 kHz receiver. This minimizes the possibility of saturation of the receiver due to less than critical coupling to the microwave cavity. Practical advantages of the present unit in low temperature spectroscopy, particularly with regard to helium bubbling and helium level change, are stressed. Comparative sensitivity tests of this unit with the standard 200 Hz magnetic field modulation systems show that, at cavity power levels smaller than 5 mW, a factor of ten improvement can be attained. At higher microwave power levels the improvement available is hampered by microphonics in the bridge. The theoretical analysis of the microwave bridge operation, of various key components, of the electronic system is presented in the text and in the appendices. (Author)
AD-652 755 Not available from CFSTI.

BLACK BODY FUNCTIONS FOR PYROTECHNICISTS,
Denver Research Inst Colo
For primary bibliographic entry see Field 19A.
AD-652 822 HC$3.00 MF$0.65

STUDY - FAR INFRARED GENERATOR.
Final rept., 1 Dec 65-30 Apr 67,
Perkin-Elmer Corp Norwalk Conn Electro-Optical Div
F. Zernike. 30 Apr 67, 26p Rept no. PE-TR-8779
Contract Nonr-4680 (00)

Descriptors: (*Infrared radiation, Sources), (*Lasers, Infrared radiation), Gas lasers, Emissivity, Alignment, Crystals, Indium antimonides, Infrared optical systems, Infrared detectors, Polarization.

A description is given of studies aimed at producing a far infrared generator by mixing two laser generated frequencies. Attempts to use two CO2 CW operating lasers proved unsatisfactory. A successful experiment was performed, however, by using a single Q-switched CO2 laser simultaneously radiating at 9.6 and 10.6 microns and focused on an InSb crystal.
AD-652 830 HC$3.00 MF$0.65

THE POSSIBILITY OF THE INTENSIFICATION AND STORAGE OF IMAGES BY MEANS OF CRYSTALLINE SCREENS,
ITT Industrial Labs San Fernando Calif
R. K. Orthuber. Jul 66, 53p
ARL-66-0150
Contract AF 33 (616)-5626

Descriptors: (*Electron beams, *Images), Light transmission, Scanning, Intensity, Single crystals, Zinc sulfides, Luminescence, Halides, Alkaline earth compounds, Monochromatic light, Lasers, Density, Absorption, Resolution, Polarization, Brightness, Amplifiers, Discoloration.

The report summarizes techniques then proposed or under study, suitable for storage and highly intensified projection display of scanned or unscanned electron images. The methods discussed are mainly: Control of light transmission by means of ZnS crystals which are charged by an intensity modulated scanning beam and change the polarization plane of a passing light beam in accordance with the local charge density (Ardenne), and Control of light transmission by discoloration of alkali halide crystals (dark trace tubes). The problems inherent in these two schemes are discussed which, in the first case, consist mainly in resolution limitations related to the limited breakdown field and, in the second case, in contrast limitations. With the advent of highly monochromatic intense light sources (lasers), much improved contrast rendition with dark trace tubes might be possible.
AD-652 848 HC$3.00 MF$0.65

INFRARED REFLECTANCE AND OPTICAL CONSTANTS OF TEKTITES,
Massachusetts Inst of Tech Cambridge
C. H. Perry, and J. D. Wrigley, Jr. 7 Nov 66, 2p
Availability: Published in Applied Optics v6 n3 p586-7 Mar 1967.

Descriptors: (*Infrared equipment, *Optical analysis), Meteorology, Iron, Meteors, Reflectivity, Astrophysics, Geology, Measurement, Temperature, Spectrophotometers, Silicon, Quantitative analysis.

The room temperature specular reflectance of three tektites was studied using spectrophotometers, interferometers, and a single beam far ir vacuum grating instrument.
AD-652 913 Not available from CFSTI.

FAR-INFRARED LASER POWER MEASUREMENTS,
Massachusetts Inst of Tech Cambridge National Magnet Lab
For primary bibliographic entry see Field 20E.
AD-653 046 Not available from CFSTI.

THE REFLECTANCE OF THE INTERMETALLIC COMPOUNDS NiAl AND CoAl,
Northwestern Univ Evanston Ill Dept of Materials Science
D. A. Kiewit, J. Rechtien, and J. O. Brittain. 25 Jul 66, 5p
AFOSR-67-1183
Contract SD-7, Grant AF-AFOSR-466-64
Availability: Published in Journal of the Physical Society of Japan v21 n11 p2380-2 Nov 1966.

Descriptors: (*Nickel compounds, Reflectivity), (*Cobalt compounds, Reflectivity), (*Aluminum compounds, *Reflectivity), Intermetallic compounds, Optical properties, Photons, Annealing, Band theory of solids.

The reflectivities at normal incidence of samples of the intermetallic compounds NiAl and CoAl are presented in the photon energy region from 0.5 to 6.0 eV. The data and their interpretation are compared with those of Sambongi, Hagiwara and Yamadaya (J. Phys. Soc. Japan v21 p923 1966). (Author)
AD-653 059 Not available from CFSTI.

A STUDY IN ADP OF SPONTANEOUS PARAMETRIC INTERACTION TUNEABLE FROM 4400A TO 16000A.
Technical rept.,
Cornell Univ Ithaca N Y Materials Science Center
Douglas Magde, and Herbert Mahr. 11 Apr 67, 16p Rept no. TR-12, MSC-670
Contract Nonr-401 (47)
Availability: Published in Physical Review Letters.

Descriptors: (*Parametric amplifiers, *Single crystals), (*Ammonium compounds, Optical phenomena), (*Lasers, Parametric amplifiers), Noise, Phosphates, Optical materials, Interactions, Pumping (Optical), Coherent radiation, Oscillators.
Identifiers: Ammonium dihydrogen phosphate.

A report is given of a quantitative experimental study of tuneable parametric amplification of quantum noise in ADP. Due to phase matching conditions the parametric noise output is limited to narrow spectral regions which could be tuned from

4400A to 16000A simply rotating the ADP crystal around the pump beam direction. A complete study of the physical parameters which determine this spontaneous parametric interaction was made and the results compared with theory. The results are also of practical interest (a) because the observed small levels of output represent the noise level of parametric light amplifiers and (b) because the measured gain allows predictions about the construction of tuneable coherent light oscillators in the visible. (Author)
AD-653 091 Not available from CFSTI.

SOME FRICTIONAL PROPERTIES OF THIN WATER FILMS.
Snow Ice and Permafrost Research Establishment Wilmette Ill
For primary bibliographic entry see Field 7D.
AD-653 132 HC$3.00 MF$0.65

RECORDING SPECTROPHOTOMETER FOR GROUND AND BALLOON MEASUREMENTS OF THE BRIGHTNESS OF THE DAYTIME SKY,
American Meteorological Society Boston Mass
For primary bibliographic entry see Field 4A.
AD-653 167 HC$3.00 MF$0.65

GROUND MEASUREMENTS OF THE ANGULAR DISTRIBUTION AND SPECTRAL COMPOSITION OF DIFFUSE SKY RADIATION,
American Meteorological Society Boston Mass
For primary bibliographic entry see Field 4A.
AD-653 168 HC$3.00 MF$0.65

THE INFRARED ABSORPTION BANDS OF OZONE,
Ohio State Univ Research Foundation Columbus
For primary bibliographic entry see Field 4A.
AD-653 195 HC$3.00 MF$0.65

A REAL TIME FOURIER TRANSFORM SYNTHESIZER,
Utah State Univ Logan Electro-Dynamics Labs
For primary bibliographic entry see Field 17H.
AD-653 200 HC$3.00 MF$0.65

OPTICAL AND ELECTRICAL PROPERTIES OF DIAMOND (OPTICAL AND ELECTRICAL PROPERTIES OF NON METALS).
Israel Atomic Energy Commission Yavne Soreq Nuclear Research Centre
For primary bibliographic entry see Field 20L.
AD-653 201 HC$3.00 MF$0.65

RESEARCH AND INVESTIGATION OF OPTICAL PROPERTIES OF SEMI-CONDUCTING CRYSTALS.
Dayton Univ Ohio Research Inst
For primary bibliographic entry see Field 20L.
AD-653 205 Not available from CFSTI.

CHARACTERISTICS OF THE STOKES EMISSION IN THE STIMULATED BRILLOUIN SCATTERING PROCESS,
Cornell Univ Ithaca N Y School of Electrical Engineering
C. L. Tang. 30 Oct 66, 61p Rept no. Scientific-1 AFCRL-67-0051
Contract AF 19 (628)-5677

Descriptors: (*Coherent radiation, *Scattering), (*Phonons, Emissivity), Line spectrum, Frequency, Photons, Photoelasticity, Acoustics, Noise, Lasers, Alkanes, Methanols, Carbon tetrachloride.
Identifiers: Brillouin scattering, Hexanes, Stokes emission.

The characteristics of the Stokes emission in the stimulated Brillouin scattering of intense laser light in non-focusing media were studied in detail both theoretically and experimentally. Simple formulas that describe the various characteristics of the Stokes emission are obtained for the case when the attenuation length of the microwave phonons involved is much shorter than the interaction length and the distance over which the Stokes intensity in the medium changes appreciably due to the stimulated Brillouin process. This condition is generally fulfilled in most room-temperature experimental situations; these results can, therefore, be used as a convenient basis for interpreting the experimental results. Stimulated Brillouin scattering of collimated ruby laser beams in such non-focusing liquids as n-hexane, methanol, and carbon tetrachloride was investigated. It was found that the experimental data obtained is in very good agreement with the calculated results obtained on the basis of the simple steady state theory given. (Author)
AD-653 210 HC$3.00 MF$0.65

SPECTROMETER SYSTEM FOR STUDYING ABSORPTION FROM EXCITED METASTABLE STATES OF IONS IN CRYSTALS,
Naples Univ (Italy) Istituto Di Meccanica Delle Macchine
H. S. Moos, C. B. Opal, and J. W. Huang. 21 Nov 66, 6p
AROD-5400:3
Contract DA-31-124-ARO (D)-339
Availability: Published in Applied Optics, v6 n5 p877-9 May 1967.

Descriptors: (*Spectrometers, Design), (*Crystal lattice defects, Spectroscopy), Flash lamps, Photomultipliers, Circuits, Crystals, Impurities, Atomic energy levels, Pumping (Optical), Relaxation time, Absorption spectrum, Lasers.

A spectrometer system for studying excited state absorption of ions in crystals is described. Pulsed xenon short arc lamps and keyed photomultipliers are used to measure the transmission after optically pumping the ions into an excited state. A wide dynamic range of absorption coefficients of excited states with lifetimes down to less than 100 microsec can be measured. A repeatability near the shot noise limit is obtained. (Author)
AD-653 244 Not available from CFSTI.

FURTHER INVESTIGATIONS WITH AN OPTICAL BEAM WAVEGUIDE FOR LONG DISTANCE TRANSMISSION.
Army Electronics Command Fort Monmouth N J Inst for Exploratory Research
For primary bibliographic entry see Field 20E.
AD-653 334 Not available from CFSTI.

ON THE THEORY OF RANDOMLY MISALIGNED BEAM WAVEGUIDES.
American Museum of Natural History New York Dept of Animal Behavior
or primary bibliographic entry see Field 9A.
AD-653 345 Not available from CFSTI.

STIMULATED FOUR-PROTON INTERACTION AND ITS INFLUENCE ON STIMULATED RAYLEIGH-WING SCATTERING,
Massachusetts Inst of Tech Lexington Lincoln Lab
P. L. Kelley, R. Y. Chiao, and E. Garmire. 29 Aug 66, 5p Rept no. JA-2889
ESD-TR-67-256
Contract AF 19 (628)-5167
Prepared in cooperation with Massachusetts Inst. of Tech., Cambridge, Dept. of Physics, and National Aeronautics and Space Administration, Cambridge, Mass., Electronics Research Center.
Availability: Published in Physical Review Letters v17 n22 p1158-61 Nov 28 1966.

Descriptors: (*Rayleigh scattering, *Photons), Light, Frequency shift, Nonlinear systems, Light transmission, Focusing, Liquids, Excitation, Interactions, Theory, Mathematical analysis.

The series of closely related phenomena known as stimulated Raman, Brillouin, and Rayleigh-wing scattering and beam trapping have given rise to a large number of interesting results. We consider here another related phenomenon of stimulated light scattering which involves a stimulated four-photon or light-by-light process (briefly discussed previously) with zero or near-zero frequency shift. This process will be shown to have some aspects not discussed previously and will be shown further to play a significant role in nonlinear processes in liquids. It is the essence of self-focusing and self-trapping. (Author)
AD-653 362 Not available from CFSTI.

InSb MOS INFRARED DETECTOR,
Massachusetts Inst of Tech Lexington Lincoln Lab
For primary bibliographic entry see Field 17E.
AD-653 365 Not available from CFSTI.

QUANTITATIVE HIGH TEMPERATURE INFRARED SPECTROSCOPY FINAL SCIENTIFIC REPORT, 1 MAY 1965 - 31 OCT. 1966.
Israel Inst. of Tech., Haifa. Dept. of Physics.
U. P. Oppenheim. 31 Oct 66, 6p AFOSR-67-0612, AD-648664
Contract AF-EOAR-65-84

Descriptors: *High temperature research, *Infrared spectroscopy, Absorption, Analysis, Band, Dependence, Emissivity, High temperature, Infrared, Intensity, Molecule, Research, Spectroscopy, Spectrum, Statistical, Temperature.

For abstract, see STAR 05 14.
N67-26488 HC$3.00 MF$0.65

PART I - RESEARCH ON THE HETEROGENEOUS STRUCTURE OF THE SOLAR ATMOSPHERE. A PROGRESS REPORT, 1964-1966. PART II - LAMBDAMETER NO. 2 FINAL SCIENTIFIC REPORT.
Observatoire de Paris (France). Service Solaire.
For primary bibliographic entry see Field 3B.
For abstract, see STAR 05 14.
N67-26785 HC$3.00 MF$0.65

STUDIES OF INFRARED IMAGE CONVERTER. (SOLID-STATE TYPE AND VACUUM TYPE) PROGRESS REPORT, 19 JUN. - 18 DEC. 1966.
Matsushita Research Inst. Tokyo, Inc., Kawasaki (Japan). Electron Device Lab.
For primary bibliographic entry see Field 9A.
For abstract, see STAR 05 14.
N67-26870 HC$3.00 MF$0.65

MODIFICATIONS FOR THE IMPROVEMENT OF THE CONNES INTERFEROMETER FINAL SCIENTIFIC REPORT, 1 DEC. 1964 - 1 SEP. 1966.
Centre National de La Recherche Scientifique, Bellevue (France).
P. Connes. 1 Sep 66, 2p AFCRL-66-776, AD-642846
Contract AF 61/052/-842

Dercriptors: *Atmospheric turbulence, *Interferometer, Astronomy, Atmospheric, Design, Instrumentation, Resolution, Spectroscopy, Turbulence.

For abstract, see STAR 05 14.
N67-27053 HC$3.00 MF$0.65

OPTICAL PROPERTIES AND VISUAL EFFECTS OF SMOKE-STACK PLUMES,
National Center for Air Polution Control, Cincinnati, Ohio.
For primary bibliographic entry see Field 13B.
PB-174 705 HC$3.00 MF$0.65

EFFECTIVENESS OF THREE VISUAL CUES IN THE DETECTION OF RATE OF CLOSURE AT NIGHT,
BioTechnology, Inc., Arlington, Va.
For primary bibliographic entry see Field 13F.
PB-174 794 HC$3.00 MF$0.65

20G. PARTICLE ACCELERATORS

THE POSSIBILITY OF THE INTENSIFICATION AND STORAGE OF IMAGES BY MEANS OF CRYSTALLINE SCREENS,
ITT Industrial Labs San Fernando Calif
For primary bibliographic entry see Field 20F.
AD-652 848 HC$3.00 MF$0.65

ORTHOGONAL WAVES ON ELECTRON BEAMS.
Army Electronics Labs Fort Monmouth N J
For primary bibliographic entry see Field 9A.
AD-653 341 Not available from CFSTI.

IPSO FACTO - A PROGRAM FOR CALCULATING BEAM ACCEPTANCE.
Gt. Brit. National Inst. for Research in Nuclear Science, Chilton. Rutherford High Energy Lab.
N. M. King, and P. W. Simpson. Jun 65, 20p
RHEL-R-103

Descriptors: *Computer program, *Momentum, *Particle beam, Acceptance, Beam, Calculation, Computer, Fortran, High energy, Particle, Program.

For abstract, see STAR 05 14.
N67-27321 HC$3.00 MF$0.65

FREQUENCY MULTIPLICATION IN HIGH-ENERGY ELECTRON BEAMS SEMIANNUAL PROGRESS REPORT, OCT. 1, 1966 - APR. 1, 1967.
Michigan Univ., Ann Arbor.
For primary bibliographic entry see Field 9E.
For abstract, see STAR 05 14.
N67-27368 HC$3.00 MF$0.65

REPORT OF NRL PROGRESS.
Naval Research Lab., Washington, D. C.
For primary bibliographic entry see Field 14B.
PB-174 738 HC$3.00 MF$0.65

TABULATION OF ATOMIC SCATTERING PARAMETERS CALCULATED CLASSICALLY FROM A SCREENED COULOMB POTENTIAL,
Sandia Corp., Albuquerque, N. Mex.
Felton W. Bingham. Aug 66, 47p

Descriptors: (*Nuclear scattering, Nuclear cross sections), (*Particle beams, Potential scattering).

For abstract, see NSA 20 24.
SC-RR-66-506 HC$3.00 MF$0.65

20H. PARTICLE PHYSICS

APPROXIMATE THERMODYNAMIC FUNCTIONS FOR THE H3O+ (g), AND CH3+ (g) IONS.
GM Defense Research Labs., Santa Barbara, Calif. Aerospace Operations Dept.
For primary bibliographic entry see Field 20M.
AD-444 078 HC$3.00

LOCAL BEHAVIOR OF STATIONARY GAUSSIAN PROCESSES,
RAND Corp., Santa Monica, Calif.
For primary bibliographic entry see Field 12A.
AD-641 323 HC$3.00 MF$0.75

MECHANISMS OF ENERGY TRANSFER IN DIELECTRICS.
New York Univ N Y Radiation and Solid State Lab
For primary bibliographic entry see Field 20C.
AD-652 723 HC$3.00 MF$0.65

RADIONUCLIDES IN OCEANS AND SEDIMENTS,
Miami Univ Fla Marine Lab
For primary bibliographic entry see Field 8G.
AD-652 743 Not available from CFSTI.

ROLE OF THE INTEGRAL-OPERATOR METHOD IN THE THEORY OF POTENTIAL SCATTERING,
Maryland Univ College Park Inst for Fluid Dynamics and Applied Mathematics
R. P. Gilbert, and H. C. Howard. 1 Feb 66, 9p
Grants AF-AFOSR-400-64, NSF-GP-3937
Prepared in cooperation with Indiana Univ., Bloomington. Dept. of Mathematics, and Wisconsin Univ., Milwaukee. Dept. of Mathematics.
Availability: Published in Journal of Mathematical Physics v8 n1 p141-8 Jan 1967.

Descriptors: (*Potential scattering, *Series), (*Operators (Mathematics), Theorems), Mapping (Transformations), Asymptotic series, Bessel functions, Approximation (Mathematics), Convergence, Determinants, Inequalities.

A recently developed method in the theory of potential scattering is investigated. The paper supplys analytic computations for determining the location and the type of singularities, which occur in several scattering amplitudes that are constructed from physically relevant potentials.
AD-652 745 Not available from CFSTI.

PARTICLES AND SOURCES,
Harvard Univ Cambridge Mass
Julian Schwinger. 6 Jul 66, 10p
AFOSR-67-1145
Contract AF 49 (638)-1380
Availability: Published in The Physical Review v152 n4 p1219-26 Dec 23 1966.

Descriptors: (*Elementary particles, Sources), Decay schemes, Theory, Interactions, Momentum, Nuclear spins, Quantum statistics, Transformations (Mathematics), Groups (Mathematics).
Identifiers: Massless particles, Source theory, Symmetry (Quantum mechanics).

It is proposed that the phenomenological theory of particles be based on the source concept, which is abstracted from the physical possibility of creating or annihilating any particle in a suitable collision. The source representation displays both the momentum and the space-time characteristics of particle behavior. Topics discussed include: spin and statistics, change and the Euclidean postulate, massless particles, and SU3 and spin. It is emphasized that the source description is logically independent of hypotheses concerning the fundamental nature of particle. (Author)
AD-652 750 Not available from CFSTI.

SYNCHROTRON RADIATION OF NEUTRINOS AND ITS ASTROPHYSICAL SIGNIFICANCE.
Columbia Univ New York Dept of Astronomy
For primary bibliographic entry see Field 3B.
AD-652 753 Not available from CFSTI.

ABSORPTION MODEL ANALYSIS OF KN TO K*(890)N REACTIONS,
Illinois Univ Urbana Dept of Physics
John T. Donohue. 1966, 39p
Contract N00014-67-A-0305-0005

Descriptors: (*Meson reactions, Analysis), (*K mesons, Decay schemes), Proton reactions, Nuclear resonance, Pions, Interactions, Predictions, Groups (Mathematics), Meson cross sections.
Identifiers: Meson exchange, Vector mesons.

The absorptive peripheral model using a mixture of pion and vector meson exchange is used to analyze data on K (plus or minus) p to K* (plus or m nus) (890)P at momenta approx. = 3 GeV/c. The vector meson exchange couplings are obtained phenomenologically by fitting the experimental data. Good fits are obtained; in particular, evidence is found for an interference effect between pion and vector meson exchange which causes differences between K* (+) and K* (-) reactions. The production of neutral K* is discussed, and an attempt is made to separate the I = 0 and I = 1 vector meson exchanges. Some predictions of the model for higher energies are presented, which suggest that the known energy dependence difficulties of vector meson exchange will make our method inapplicable. Evidence for the interference effect in other reactions is s ggested, and experimental tests are proposed. (Author)
AD-652 826 HC$3.00 MF$0.65

RAPIDLY DECREASING FORM FACTORS AND INFINITELY COMPOSITE PARTICLES,
Illinois Univ Urbana Dept of Physics
John D. Stack. 1966, 29p
Contract N00014-67-A-0305-0005

Descriptors: (*Elementary particles, Mathematical models), Nuclear scattering, Interactions, Momentum, Wave functions, Nucleons, Decay schemes, Baryons, Nuclear resonance.
Identifiers: Form factors, Bootstrap hypothesis, Hadrons.

The problem of understanding the asymptotic behavior of hadron electromagnetic form factors is considered. It is shown that if the hadrons form a bootstrap, each hadron must be a bound state of an infinite number of particles, or infinitely composite. A simple model containing an infinitely composite particle is constructed and the form factor of the particle is calculated. The form factor decreases exponentially for large space-like momentum transfers. On the basis of this it is suggested that a criterion for a bootstrap should be exponentially decreasing form factors for all hadrons. (Author)
AD-652 827 HC$3.00 MF$0.65

A THEOREM ON SPIN-EIGENFUNCTIONS.
Technical note,
Massachusetts Inst of Tech Lexington Lincoln Lab
Thomas A. Kaplan, and Walter H. Kleiner. 24 May 67, 18p Rept no. TN-1967-15
ESD-TR-67-277
Contract AF 19 (628)-5167

Descriptors: (*Wave functions, Theorems), (*Spin, Functions), Hamiltonian, Hartree-Fock approximation, Approximation (Mathematics), Electrons, Antiferromagnetism, Operators (Mathematics), Ferromagnetism, Vector analysis.

A theorem is proved to the effect that a wave function for a set of N spins, which is a product of single-spin wave functions and which is an eigenstate of the square of the total spin, must be a state with the maximum possible value of Sz, z being an arbitrary direction. This theorem has been applied in a separate work to show strikingly that the imposition of symmetry restrictions of a common type on an approximate wave function can lead to a very poor physical description.
AD-652 840 HC$3.00 MF$0.65

GALACTIC DEUTERIUM AND ITS ENERGY SPECTRUM ABOVE 20 MeV PER NUCLEON,
Chicago Univ Ill Enrico Fermi Inst for Nuclear Studies
For primary bibliographic entry see Field 3B.
AD-652 949 Not available from CFSTI.

SPATIAL DISTRIBUTION OF ENERGETIC ELECTRONS IN THE GEOMAGNETIC TAIL.
Chicago Univ Ill Enrico Fermi Inst for Nuclear Studies
For primary bibliographic entry see Field 4A.
AD-652 950 Not available from CFSTI.

GAUGE PROPERTIES OF THE MINKOWSKI SPACE,
Princeton Univ N J Palmer Physical Lab
For primary bibliographic entry see Field 20K.
AD-652 961 Not available from CFSTI.

ABSOLUTE MEASUREMENTS OF TOTAL CROSS SECTIONS FOR THE SCATTERING OF LOW-ENERGY ELECTRONS BY ATOMIC AND MOLECULAR OXYGEN,
New York Univ N Y Dept of Physics
For primary bibliographic entry see Field 7D.
AD-652 963 Not available from CFSTI.

CORRELATION OF INFRARED AND INELASTIC NEUTRON SCATTERING SPECTRA,
Massachusetts Inst of Tech Cambridge Dept of Nuclear Engineering
For primary bibliographic entry see Field 7D.
AD-652 966 Not available from CFSTI.

ANALYTICITY CONSTRAINTS ON UNEQUAL-MASS REGGE FORMULAS,
Princeton Univ N J Palmer Physical Lab
For primary bibliographic entry see Field 20J.
AD-652 975 Not available from CFSTI.

DYNAMICAL THEORY OF STRONG INTERACTIONS,
Yeshiva Univ New York Belfer Graduate School of Science
Leonard Susskind. 5 Aug 66, 22p
AFOSR-67-1196
Grants AF-AFOSR-816-65, AF-AFOSR-508-66
Research supported in part by NSF.
Availability: Published in The Physical Review v154 n5 p1411-29 Feb 25 1967.

Descr ptors: (*Quantum statistics, *Interactions), (*S-matrix, *Quantum mechanics), Elementary particles, Scattering, Dynamics, Approximation (Mathematics), Baryons, Mesons, Hamiltonian, Potential theory.

The many-body quantum mechanics of a set of (self-consistent) composite particles is developed for use as the basis for a theory of strong interactions. The theory deals only with physical particles which may in general have an extended spatial structure. It is a bootstrap theory in which physical particles are examined in terms of superpositions of the physical multiparticle states of the theory; no auxillary quantities such as bare particles or fundamental local fields are introduced and no question of renormalization is encountered. Many-particle states are constructed which are (many-) three-momentum eigenstates and whose spatial integrity is assured via cl ster-decomposition properties. The present theory is a dynam cal theory in the sense that there is a Hamiltonian that respects the extended and composite structure of the particles and which, unlike S-matrix theory, allows a system to be studied during the course of its interactions. A drawback of the theory is that it is not manifestly Lorentz-covariant. The present paper deals with the theory in a simplified form in which heavy baryons interact with structureless mesons in the static limit of no baryon recoil. The self-consistent bootstrap dynamics is examined in the lowest order approximation, including some three-body effects. The conventional Born approximation to the scattering amplitude is recovered. The relation between the existence of particles and signs of forces is obtained. In particular the Cutkosky connection between attractive forces and group-theoretic structure is derived.
AD-652 976 Not available from CFSTI.

CONSISTENCY OF CURRENT COMMUTATION RELATIONS AND RELATED CONSIDERATIONS,
Harvard Univ Cambridge Mass Dept of Physics
For primary bibliographic entry see Field 20J.
AD-653 047 Not available from CFSTI.

NUCLEAR PROCESSES IN COMETS,
Palomar Observatory Pasadena Calif
For primary bibliographic entry see Field 3A.
AD-653 049 Not available from CFSTI.

ENERGY TRANSFER AND ELECTRON CONDUCTION IN THE FLUID TRANSPORTATION ARC.
Technical rept.,
Col mbia Univ New York Electronics Research Labs
P. S. Tschang. 17 Feb 67, 219p Rept no. T-1/312
AFOSR-67-0769
Contract AF 49 (638)-1395

Descr ptors: (*Electrical conductance, *Electrons), (*Conduction (Heat transfer), Electrons), Fluids, Argon, Hall effect, Gases, Tables, Diagrams, Flow fields, Theory.

The energy relaxation and electrical conductivity of an electron gas in an argon arc discharge at 1 atm has been examined theoretically and observed quantitatively in an experimental arrangement. The plasma column utilized for study is the type generated in a fluid transpiration arc equipment in which the argon working fluid is injected through a porous graphite anode. The rate of forced convection is such as to insure significant electron-heavy particle nonequiligrium in the sample volume of interest. Accordingly, the electrical conductivity and the two-temperature vol me rates of energy transfer have been obtained. The diagnostic techniques include Hall-effect magnetic field probe for current density, floating electrostatic probe for electrical field, spherical thermocouple heat transfer probe for henvy particle temperature and continuum spectrum intensity measurement for electron density and temperature. High-speed motion pictures provide a qualitative study of the plasma volume as well as its reaction to a mater al probe. (Author)
AD-653 196 HC$3.00 MF$0.65

DETACHMENT OF ELECTRONS FROM H (-) BY ELECTRON IMPACT,
Joint Inst for Lab Astrophysics Boulder Colo
For primary bibliographic entry see Field 3B.
AD-653 247 Not available from CFSTI.

POLARIZATION OF LIGHT FROM e (-)He COLLISIONS.
Massachusetts Univ Amherst
For primary bibliographic entry see Field 7D.
AD-653 307 Not available from CFSTI.

THE NEUTRON-NUCLEUS INTERACTION.
Doctoral thesis.
Ohio Univ Athens Dept of Physics
R. L. Cassola, and R. D. Koshel. 21 Dec 66, 6p
AFOSR-67-1241
Grant AF-AFOSR-854-65
Supported in part by NSF.
Availability: Published in 11 Nuovo Cimento v47 Ser10 p303-5 Feb 11 1967.

Descriptors: (*Nuclei, *Neutron scattering), Neutron reactions, Potential scattering, Nuclear models, Elastic scattering, Differential cross section.
Identifiers: Optical nuclear models.

It is briefly announced that an optical potential containing four parameters which are independent of each other and depend smoothly on energy was found adequate to explain the elastic neutron scattering data obtained in thirty-four experiments with neutrons of 6-24 MeV incident upon target nuclei having masses greater than 25 a.m.u. (Author)
AD-653 309 Not available from CFSTI.

LINKED CLUSTER THEOREM AND THE GREEN'S FUNCTION EQUATIONS OF MOTION FOR A MANY-FERMION SYSTEM,
Uppsala Univ (Sweden) Quantum Chemistry Group
For primary bibliographic entry see Field 20J.
AD-653 321 Not available from CFSTI.

BEST ENERGY CRITERION AND THE PRINCIPLE OF COMPENSATION OF DANGEROUS DIAGRAMS,
Uppsala Univ (Sweden) Quantum Chemistry Group
For primary bibliographic entry see Field 20J.
AD-653 322 Not available from CFSTI.

ON THE MAGNETOSPHERES OF SELF-GRAVITATING BODIES,
Columbia Univ New York Dept of Astronomy
L. Woltjer. 24 Oct 66, 5p
AFOSR-67-1252
Contract AF 49 (638)-1358
Availability: Published in The Astrophysical Journal v148 n1 p291-3 Apr 1967.

Descriptors: (*Magnetosphere, *Cosmic rays), (*Upper atmosphere, Magnetic fields), Theorems, Acceleration, Gravity, Gases, Equations of motion, Relativity theory, Galaxies.

In theories of radio sources and cosmic-ray acceleration, frequently a situation is envisioned in which a gas or relativistic particles are confined by a magnetic field which is anchored in a central body that is kept in equilibrium by its self-gravitation. We propose to derive some general theorems applicable to this situation.
AD-653 324 Not available from CFSTI.

CALCULATION OF IONIZATION POTENTIAL OF VARIOUS ATOMS,
Army Electronics Command Fort Monmouth N J Inst for Exploratory Research
Gerald J. Iafrate. 19 Jul 66, 5p
Availability: Published in Journal of Chemical Physics v46 n2 p728-31 Jan 15 1967.

Descriptors: (*Ionization potentials, *Atoms), (*Mathematical analysis, Ionization potentials), Valence, Electrons, Ions, Atomic properties, Energy, Tables.

A calculation of the ionization potential of various atoms has been done by assuming a pseudocore potential in the form of a simple analytical expression. The results calculated by using the variational method on hydrogenlike orbitals are in reasonable agreement with the experimental values. (Author)
AD-653 339 Not available from CFSTI.

CRITERION FOR APPLICATION OF THE DIFFERENTIAL DOPPLER METHOD,
American Museum of Natural History New York Dept of Animal Behavior

For primary bibliographic entry see Field 20N.
AD-653 348 Not available from CFSTI.

A PHOTOMETRIC DEVICE FOR THE IDENTIFICATION OF MULTIPLY CHARGED PARTICLES STOPPING IN NUCLEAR EMULSIONS,
Lund Univ (Sweden) Dept of Physics
For primary bibliographic entry see Field 18D.
AD-653 354 Not available from CFSTI.

LOW ENERGY HEAVY PRIMARY PARTICLES IN COSMIC RADIATION,
Lund Univ (Sweuen) Dept of Physics
For primary bibliographic entry see Field 4A.
AD-653 355 Not available from CFSTI.

ENERGY AND ANGULAR DISTRIBUTION OF NEUTRONS AND GAMMA RAYS OPERATION BREN,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 6R.
For abstract, see NSA 21 12.
CEX-62.12 HC$3.00 MF$0.65

DETERMINATION OF FAST NEUTRON SPECTRA IN A HEAVY WATER REACTOR USING NUCLEAR EMULSIONS,
Iowa State Univ. of Science and Technology, Ames.
Jimmie R. Youngblood. Sep 66, 21p
Contract W-7405-eng-82

Descriptors: (*Heavy water reactors, Fast neutrons), (*Fast neutrons, Nuclear power plants), Neutron flux.

For abstract, see NSA 21 04.
IS-1448 HC$3.00 MF$0.65

A USERS MANUAL FOR ANISN A ONE DIMENSIONAL DISCRETE ORDINATES TRANSPORT CODE WITH ANISOTROPIC SCATTERING,
Oak Ridge Gaseous Diffusion Plant, Tenn.
Ward W. Engle, Jr. 30 Mar 67, 89p
Contract W-7405-eng-26

Descriptors: (*Anisotropy, *Programming languages), (*Input-output devices, Programming (Computers)), Geometry, Scattering.

For abstract, see NSA 21 12.
K-1693 HC$3.00 MF$0.65

WEAK ALPHA AND ELECTRON-CAPTURE DECAY IN 208 PO AND 209 PO,
Mound Lab., Miamisburg, Ohio.
G. R. Hagee, R. C. Lange, and J. T. McCarthy.
20 May 65, 58p
Contract AT (33-1)-GEN-53

Descriptors: (*Polonium, Decay schemes), (*Radioactive decay, Polonium).

For abstract, see NSA 21 04.
MLM-1251 HC$3.00 MF$0.65

SPECTRAL ABSORPTION COEFFICIENTS OF CARBON, NITROGEN, AND OXYGEN ATOMS.
Lockheed Missiles and Space Co., Palo Alto, Calif. Research Lab.
W. E. Nicolet, and K. H. Wilson. Nov 66, 86p
NASA-CR-73049, LMSC-4-17-66-5
Contract NAS2-3496

Descriptors: *Absorption spectrum, *Carbon, *Nitrogen atom, *Oxygen atom, *Radiant energy, Absorption, Atom, Coefficient, Energy, Flow, Ionization, Neutral, Nitrogen, Oxygen, Plasma, Radiation, Reentry, Single, Spectrum, Table, Transfer.

For abstract, see STAR 05 06.
N67-15686 HC$3.00 MF$0.65

GENERALIZED POTENTIALS FOR INELASTIC SCATTERING.
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
For primary bibliographic entry see Field 20J.
For abstract, see STAR 05 14.
N67-26554 HC$3.00 MF$0.65

ON THE THEORY OF COULOMB INTERACTION.
National Aeronautics and Space Administration, Washington, D. C.
For primary bibliographic entry see Field 20J.
For abstract, see STAR 05 14.
N67-26598 HC$3.00 MF$0.65

RESEARCH INVESTIGATION DIRECTED TOWARD EXTENDING THE USEFUL RANGE OF THE ELECTROMAGNETIC SPECTRUM PROGRESS REPORT, 1 MAY - 31 OCT. 1966.
Columbia Univ., New York. Columbia Radiation Lab.
For primary bibliographic entry see Field 7D.
For abstract, see STAR 05 14.
N67-26616 HC$3.00 MF$0.65

CHIRAL ALGEBRA CONDITIONS ON PIN AMPLITUDES.
Istituto Superiore Di Sanita, Rome (Italy). Laboratori Di Fisica.
For primary bibliographic entry see Field 20J.
For abstract, see STAR 05 14.
N67-27133 HC$3.00 MF$0.65

QUASI-FREE SCATTERING EXPERIMENTS AND THE CALCULATION OF SINGLE PARTICLE ENERGIES IN NUCLEI.
Istituto Superiore Di Sanita, Rome (Italy). Laboratori Di Fisica.
U. JR.Amaldi. 16 Jan 67, 48p ISS-67/2

Descriptors: *Free energy, *Nucleon-nucleon scattering, *Particle collision, Calculation, Collision, Energy, Experiment, Free, Hartree-fock calculation, Interaction, Mass, Measurement, Model, Nucleon, Nucleus, Particle, Physics, Scattering, Separation, Theoretical.

For abstract, see STAR 05 14.
N67-27134 HC$3.00 MF$0.65

ELASTIC AND INELASTIC SCATTERING OF 42- ME V ALPHA PARTICLES FROM EVEN TELLURIUM ISOTOPES.
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
N. Baron, R. F. Leonard, and W. M. Stewart. May 67, 31p NASA-TN-D-3991

Descriptors: *Alpha radiation, *Angular distribution, *Elastic scattering, *Inelastic scattering, *Radioactive isotope, *Tellurium, Alpha, Angular, Beam, Calculation, Cross section, Cyclotron, Distribution, Elastic, Excitation, Inelasticity, Isotope, Measurement, Model, Particle, Radiation, Radioactivity, Scattering, Target.

For abstract, see STAR 05 14.
N67-27225 HC$3.00 MF$0.65

STUDY OF THE ABSORPTION IN WATER OF PHOTONEUTRONS OF ENERGY GREATER THAN 50 ME V.
Studio Dell'assorbimento Di Fotoneutroni Di Energia Maggiore Di 50 Mev in Acqua
Comitato Nazionale Per L Energia Nucleare, Frascati (Italy).
M. A. Locci, M. Pelliccioni, P. Picchi, and G. Verri. 3 Feb 67, 9p LNF-67/5
in Italian Its Nota Interna No. 347

Descriptors: *Absorption, *Energy level, *Reactor technology, Cascade, Energy, Fortran, Level, Linear accelerator, Mathematics, Physics, Reactor, Technology, Water.

For abstract, see STAR 05 14.
N67-27253 HC$3.00 MF$0.65

ESTIMATION OF ELECTRON IMPACT EXCITATION CROSS SECTIONS OF MOLECULAR HYDROGEN.
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
H. J. Hettel, C. F. Monnin, and G. M. Prok. Jun 67, 40p NASA-TN-D-4004
Contract 129-01-05-09-22

Descriptors: *Electron impact, *Hydrogen, *Ionization cross section, Calculation, Cross, Electron, Energy, Exchange, Excitation, Ground, Impact, Ionization, Level, Model, Physics, Quantum, Section, State, Theoretical.

For abstract, see STAR 05 14.
N67-27276 HC$3.00 MF$0.65

SMALL ANGLE ELECTRON PROTON ELASTIC SCATTERING CROSS SECTIONS FOR MOMENTUM TRANSFERS BETWEEN 10 AND 105 F MINUS 2.
Deutsches Elektronen-synchrotron, Hamburg (West Germany).
W. Bartel, B. Dudelzak, H. Krehbiel, J. M. Mc Elroy, and U. Meyer-berkhout. Jul 66, 14p
DESY-66/20

Descriptors: *Elastic scattering, *Electron scattering, *Proton scattering, *Scattering cross section, Cross section, Elastic, Electron, Measurement, Momentum, Proton, Scattering, Transfer.

For abstract, see STAR 05 14.
N67-27341 HC$3.00 MF$0.65

INVESTIGATION OF GAMMA-SPECTRA OF 75 SE, 106 RH, 110M AG, 124 SB, 125 SB, 140 BA, 140 LA, AND 154 EU.
Joint Inst. for Nuclear Research, Dubna (USSR). Lab. of Neutron Physics.
For primary bibliographic entry see Field 18B.
For abstract, see STAR 05 14.
N67-27344 HC$3.00 MF$0.65

THERMAL NEUTRON DEPTH DOSE DEPENDENCE ON BEAM AND PHANTOM SIZE FOR INCIDENT COLLIMATED BEAMS OF FAST NEUTRONS.
Production Group, United Kingdom Atomic Energy Authority, Annon (Scotland). Health and Safety Dept.
R. C. Lawson, and D. E. Watt. 1967, 19p PG-774/CC/

Descriptors: *Fast neutron, *Neutron flux, *Thermal neutron, Beam, Collimation, Collision, Density, Depth, Diffusion, Distribution, Dose, Elastic, Fast, Flux, Group, Incidence, Magnitude, Neutron, Peak, Phantom, Phosphor, Plastic, Position, Radiobiology, Size, Theory, Thermal, Tissue, Two.

For abstract, see STAR 05 14.
N67-27554 HC$3.00 MF$0.65

PRODUCTION OF POSITRONS BOMBARDMENT OF THICK FOILS FAST ELECTRONS.
Pozhdeniye Positronov Pri Prokhozhdenii Bystrykh Elektronov Cherez Tolstyye Fol'gi
Nationa Aeronautics and Space Administration, Washington, D. C.

A. V. Bautin, and V. M. Galitskiy. May 67, 4p
NASA-TT-F-10932
Transl. Into English From At. Energ. (USSR) (Moscow), V. 21, No. 2, Aug. 1966 P 126-127

Descriptors: *Angular distribution, *Electron bombardment, *Foil, *Positron, Angular, Bombardment, Calculation, Converter, Design, Distribution, Electron, Elementary, Energy, Interval, Layer, Outflux, Pair, Particle, Photon.

For abstract, see STAR 05 14.
N67-27561 HC$3.00 MF$0.65

GALACTIC X-RAYS. (A SUMMARY PREPARED FOR THE 1968 YEARBOOK OF SCIENCE AND TECHNOLOGY, MC GRAW- HILL).
National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbe lt, Md.
E. Boldt. May 67, 8p NASA-TM-X-55795, X-611-67-222

Descriptors: *Galaxy, *Radio source, *X-ray astronomy, Airborne, Astronomy, Balloon, Emission, Energy, Flux, Instrumentation, Measurement, Observation, Radio, Rocket, Source, Spectral, State, Upper atmosphere, X-ray.

For abstract, see STAR 05 14.
N67-27565 HC$3.00 MF$0.65

A NEW TREATMENT OF THE COLLECTIVE MOTION OF CHARGED PARTICLES.
Tokyo Metropolitan Univ. (Japan). Dept. of Physics.
T. Mituda. 1965, 32p NUP-67-3

Descriptors: *Charged particle, *Particle motion, Average, Charge, Collective, Distribution, Electromagnetic, Equation, Field, Function, Macroscopy, Maxwell equation, Microscopy, Moment, Motion, Particle, Plasma, Stress, Tensor.

For abstract, see STAR 05 14.
N67-27683 HC$3.00 MF$0.65

GAS EQUATION OF STATE FOR NATURAL MATERIALS,
California Univ., Livermore. Lawrence Radiation Lab.
For primary bibliographic entry see Field 18C.
For abstract, see NSA 21 12.
UCRL-14729 HC$3.00 MF$0.65

NUCLEAR REACTION Q-VALUES,
California Univ., Berkeley. Lawrence Radiation Lab.
For primary bibliographic entry see Field 18B.
For abstract, see NSA 21 02.
UCRL-16964 HC$3.00 MF$0.65

CALCULATION OF NEUTRON ELASTIC CROSS SECTIONS USING ELECTROMAGNETIC TRANSITION DATA,
California Univ., Livermore. Lawrence Radiation Lab.
Harry F. Lutz, and John D. Anderson. 14 Feb 67, 51p
Contract W-7405-eng-48

Descriptors: (*Inelastic scattering, *Neutron cross sections), (*Even-even nuclei, *Even-odd nuclei), Excitation, Neon, Plutonium, Fast neutrons, Charged particles.

For abstract, see NSA 21 12.
UCRL-50181 HC$3.00 MF$0.65

ESTIMATES OF ALPHA-DECAY LIFETIMES FOR SUPERHEAVY NUCLEI,
California Univ., Livermore. Lawrence Radiation Lab.
For primary bibliographic entry see Field 7E.
For abstract, see NSA 21 12.
UCRL-50183 HC$3.00 MF$0.65

20I. PLASMA PHYSICS

THE DIAGNOSTIC APPLICATIONS OF MICROWAVE ABSORPTION AND DISPERSION.
Technical rept. on Hypervelocity Range Research Program,
GM Defense Research Labs., Santa Barbara, Calif.
I. P. French. 31 Jan 65, 24p TR-65-01D
Contract DA-01-021-AMC-11359 (Z), ARPA Order-347

Descriptors: (*Microwave spectroscopy, Plasma sheath), (*Electron density, Microwave spectroscopy), Phase shift, Resonance absorption, Absorption spectrum, Wake, Oxygen, Dielectric properties.
Identifiers: Fabry-Perot cavity.

The possibility of measuring species concentration in high-temperature air by microwave spectroscopy is considered. The species selected for consideration are molecular oxygen, which has transitions in the region from 52 to 68 gc, and nitric oxide with transitions around 150 gc. The feasibility appears marginal, but this evaluation is based on many approximations and assumptions and further work is required for definitive conclusions. thor)
AD-459 651 HC$3.00

EARLY RESULTS FROM THE TOPSIDE SOUNDER IN THE ALOUETTE II SATELLITE,
Defence Research Telecommunications Establishment Ottawa (Ontario) Radio Physics Lab
For primary bibliographic entry see Field 4A.
AD-652 759 Not available from CFSTI.

PULSE-STIMULATED RADIATION FROM A PLASMA DUE TO AN ENERGY-DEPENDENT GYROFREQUENCY.
Technical rept.,
California Inst of Tech Pasadena
W. H. Kegel. 22 May 66, 17p Rept no. TR-35
Sponsored by ONR.
Availability: Published by Plasma Physics v9 p23-38 1967.

Descriptors: (*Plasma medium, Thermal radiation), Frequency, Charged particles, Functional analysis, Magnetic fields, Fourier analysis, Excitation, Cyclotron resonance phenomena.

A plasma excited by two short pulses at the electron gyrofrequency which have a time separation tau, is considered in the single particle approach. It is shown that the relativistic mass effect can lead to a series of radiation maxima after the second pulse. In the case of a cold plasma in an imhomogeneous magnetic field these maxima arise at multiples of the time tau; in the case of a warm plasma in a homogeneous magnetic field at multiples of tau/absolute value of (1 plus or minus D), where D is the strength of the second pulse relative to the first one. The shape of the radiation maxima is given by the square of the Fourier transform of the distribution of the inhomogeneities or the initial energies, respectively. The two effects have the tendency to cancel each other. If the plasma is excited by three pulses, the time separation of the second and third pulse being T, radiation maxima occur at times t = K tau + LT, (plus or minus K, L = 0, 1, 2, ... but t > 0) after the third pulse in the case of cold plasma with field inhomogeneities, and at t = (K tau + LT)/absolute value of (1 plus or minus D plus or minus D2) in the case of a warm plasma. If collisions are taken into account the dependence on T of the radiation maxima with L = 0 is determined by inelastic collisions only, while the other decay times are determined by all kinds of collisions. (Author)
AD-652 790 Not available from CFSTI.

THE INFLUENCE OF ENERGY-DEPENDENT RELAXATION TIMES AND CHARGECARRIER MASS ON IONIZATION WAVES IN PLASMAS,
Royal Inst of Tech Stockholm (Sweden) Microwave Dept
For primary bibliographic entry see Field 20L.
AD-652 839 HC$3.00 MF$0.65

POSSIBILITY OF ION-WAVE AMPLIFICATION IN A PLASMA,
Massachusetts Inst of Tech Cambridge Research Lab of Electronics
Michael Schulz. 15 Aug 66, 2p
Contracts DA-36-039-AMC-03200 (e), Nonr-1841 (42)
Availability: Published in Physics of Fluids v10 n1 p244-5 Jan 1967.

Descriptors: (*Plasma medium, Acoustics), Gas ionization, Electron density, Transport properties, Plasma physics, Ions.
Identifiers: Amplification, Acoustic waves, Energy transfer.

The ion-acoustic dispersion relation for a two-component plasma, calculated in the presence of intercomponent energy transfer but in the absence of ion-acoustic losses, exhibits amplification in this mode if the election gas is assumed to behave isothermally. (Author)
AD-652 894 Not available from CFSTI.

CHARACTERISTICS OF CYLINDRICAL ARCS AT HIGH TEMPERATURES,
Advisory Group for Aeronautical Research and Development Paris (France)
Th. Peters. Sep 59, 22p Rept no. AGARD-325
N62-14520
NATO Furnished.

Descriptors: (*Plasma medium, *Electric arcs), High-temperature research, Magnetic properties, Pressure, Temperature, Electric fields, Gas ionization, Entropy, France.

The properties of stationary cylindrical arcs at very high temperatures are studied on the basis of a fully ionized hydrogen-like plasma. The fundamental equations of this problem, the energy balance, the current-voltage equation and the condition for the equilibrium between magnetic pressure and gas pressure are not integrated exactly but solved with the aid of Steenbeck's principle of minimal electric field strength, the principle which is shown to present a special case of the universal thermodynamic principle of minimal entropy production. By comparison with some experimental data in the temperature range up to 50,000K and with results of the nearly exact method of approximation given by Maecker, it is shown that the application of this principle leads to proper approximate solutions in a rather simple way. (Author)
AD-652 930 HC$3.00 MF$0.65

THEORY OF PLASMA RADIATION. I. MATHEMATICAL DEVELOPMENT,
Yale Univ New Haven Conn
H. Margenau, and P. Mallozzi. 1966, 5p
AFOSR-67-1169
Grant AF-AFOSR-843-65
Availability: Published in Proceedings of the International Conference on Phenomena in Ionized Gases (7th) v2 p9-11 1966.

Descriptors: (*Plasma medium, *Cyclotron resonance phenomena), Theory, Mathematical analysis, Electrons, Matrix algebra, Perturbation theory.

The paper offers the general formalism of an analysis which, following the main lines of Prigogine

and Balescu, incorporates a classical radiation field in an assemblage of electrons and atoms or ions. Radiation is described in terms of action and angle variables. These lead to simple additional terms in the Liouville equation. In developing the perturbation theory, many new matrix elements appear. They are described by means of graphs. The work is carried systematically to the fourth order of the perturbation Liouville operator. General properties, such as conservation laws and an H-theorem, are proved. Simple, easily interpretable formulas result when all matrix elements are evaluated in a manner which neglects the momentum of the radiation. To date, detailed calculations have been limited to this degree of accuracy. They nevertheless allow the applications discussed in the paper. (Author)
AD-652 989 Not available from CFSTI.

ON ANOMALOUS PLASMA TRANSPORT IN R.F. DISCHARGES,
Texas Univ Austin Dept of Electrical Engineering
E. J. Powers, and P. B. Mumola. 31 Dec 66, 3p
AFOSR-67-1175
Grants AF-AFOSR-766-66, NSF-GK-845
Availability: Published in Physics Letters v24A n4 p220-1 Feb 13, 1967.

Descriptors: (*Plasma medium, Anomalies), Magnetic fields, Transport properties, Stability, Electrons, Gas ionization, Plasma physics.
Identifiers: Ion-acoustic instability.

The growth criterion for an ion-acoustic instability predicts a critical magnetic field dependence on pressure p, tube radius R, and ion mass mi, which is in good agreement with the experimental observations in the low pressure r.f. discharge. (Author)
AD-653 054 Not available from CFSTI.

SPECTROGRAPHIC MEASUREMENTS ON AN ARC DISCHARGE.
Revised ed.,
Vanderbilt Univ Nashville Tenn Dept of Physics
John Paul Barach. 22 Aug 66, 5p
AFOSR-67-1177
Grant AF-AFOSR-287-66
Revision of manuscript submitted 15 Jul 66.
Availability: Published in Journal of Applied Physics v38 n1 p64-7 Jan 1967.

Descriptors: (*Gas discharges, Spectroscopy), (*Electric arcs, Spectroscopy), (*Plasma medium, Spectroscopy), Stark effect, Helium, Kerr cells, Gas ionization, Excitation, Atomic energy levels, Shock tubes.

A 20 kiloampere arc is studied spectroscopically by a Kerr-cell shuttered spectrograph. Stark broadening and line-to-line intensity ratios were used to measure Ne and Te. The arc was found to quickly evolve many times the initial density in wall materials and to lack thermodynamic equilibrium. (Author)
AD-653 057 Not available from CFSTI.

QUARTERLY STATUS REPORT NO. 105, 1 JANUARY THROUGH 31 MARCH 1967.
Stanford Univ Calif Stanford Electronics Labs
31 Mar 67, 103p Rept no. SEL-67-020
Contract Nonr-225 (83)
See also AD-649 819.

Descriptors: (*Plasma physics, Reports), (*Electronics, Magnetic fields), Semiconductor devices, Systems engineering, Electron beams, Masers, Gallium arsenides, Van Allen radiation belt, Pattern recognition, Networks, Integrated circuits, Information theory, Semiconductors, Ionospheric disturbances.

Progress during the period is reported under the following fields: (1) Plasma physics and quantum electronics; (2) Radioscience; (3) Solid-state electronics; (4) Systems techniques; (5) Systems theory.
AD-653 095 HC$3.00 MF$0.65

DISSIPATIVE WAVE PROPAGATION IN COMPRESSIBLE MAGNETOHYDRODYNAMICS,
Brown Univ Providence R I Div of Applied Mathematics
Eric P. Salathe, and Lawrence Sirovich. 13 May 66, 12p
Contract Nonr-562 (39), Grant NSF-GP-3753
Availability: Published in Physics of Fluids v10 n2 p372-80 Feb 1967.

Descriptors: (*Magnetohydrodynamics, Propagation), Compressible flow, Dissipation factor, Equations, Matrix algebra.

A complete discussion of the linearized, compressible magnetodhydrodynamic equations is given. No restriction is placed on any of the dissipative mechanisms, and moreover the nature of the gas is unspecified. Fundamental solutions are obtained for arbitrary values of the pertinent dimensionless parameters as well as field orientation. Use of the fundamental solutions is illustrated by the construction of solutions for several problems. Various inviscid limits are considered, and restrictions on inviscid theory thereby result. (Author)
AD-653 122 Not available from CFSTI.

PLASMA PHYSICS IN AN ASTROPHYSICAL ENVIRONMENT.
King'S Coll London (England)
For primary bibliographic entry see Field 3A.
AD-653 211 HC$3.00 MF$0.65

SURFACE EFFECTS IN SEEDED COMBUSTION PRODUCTS,
Cornell Univ Ithaca N Y Graduate School of Aerospace Engineering
Donald L. Turcotte. 10 Sep 65, 44p
AGARD-CP-Ser-8, AFOSR-67-1216
Contract AF 49 (638)-1346
Prepared for presentation at the proceedings of Specialists' Meeting AGARD Propulsion and Energetics Panel, University of Pisa, Pisa, Italy 6-10 September 1965.

Descriptors: (*Plasma medium, *Probes), (*Combustion products, Plasma physics), Flames, Additives, Sodium compounds, Potassium compounds, Hydroxides, Cesium compounds, Chlorides, Langmuir probes, Electrodes, Surfaces, Interactions, Plasma sheath, Electric currents, Work functions.
Identifiers: Plasma probes, Cesium c iloride, Potassium hydroxide, Sodium hydroxide.

Current-voltage characteristics of a double probe were obtained in the products of combustion of a seeded, atmospheric-pressure, alcohol-air flame. Sodium hydroxide, potassium hydroxide, and cesium chloride were the seed compounds used. An electric current was driven between a pair of small, circular electrodes embedded on the stagnation line of a cylindrical, boron-nitride probe. The temperature of the electrode surfaces could be controlled and measured. Saturation currents were measured which were independent of the electrode temperature below 500K and increased rapidly when the electrode temperature was increased above 500K. The appropriate continuum sheath theory is developed. The theory predicts ion saturation currents and the resistance to the flow of current between the electrodes. The properties of the combustion products are calculated using the measured temperature. Partial dissociation of the seed molecules and electron attachment to the hydroxyl radical are considered. The calculated resistances are in reasonably good agreement with the measured values. The calculated ion saturation currents are three to four orders of magnitude smaller than the measured values. It is concluded that there is electron emission from the electrodes. (Author)
AD-653 216 HC$3.00 MF$0.65

REPLY,
Stanford Univ Calif Dept of Geophysics
For primary bibliographic entry see Field 18C.
AD-653 243 Not available from CFSTI.

CONVECTIVE INSTABILITIES DRIVEN BY ELECTROMAGNETIC WAVES,
Texas Univ Austin Dept of Physics
E. L. L indman. 10 Jun 66, 13p
AROD-6398:1
Grant DA-ARO (D)-31-124-G805
Availability: Published in Physics of Fluids v10 n2 p386-405 Feb 1967.

Descriptors: (*Electromagnetic waves, Asymptotic series), (*Plasma medium, Stability), Electromagnetic fields, Radiofrequency, High frequency, Low frequency, Density, Magnetic fields, Propagation, Interactions, Perturbation theory, Direct current.

A description of destabilizing effects present in a plasma due to the radio frequency motion of the two species is obtained by expanding the fluid equations and the electromagnetic wave equations in an asymptotic series. Equations for the high-frequency and low-frequency motion are separated, linearized, and solved for a plasma with a density gradient perpendicular to a magnetic field. An electromagnetic wave propagating in a direction parallel to the density gradient at a frequency near the lower hybrid is considered. A convenient method of description of the interaction between the electromagnetic wave and the unstable density perturbation involving the simultaneous introduction of more than one phase operator is given. It is found that time average terms which contain the effects of radio frequency gradient forces lead to effects of radio frequency gradient forces lead to instability in qualitative agreement with experiments on electrodeless radio frequency discharges.
AD-653 253 Not available from CFSTI.

THE INFLUENCE OF FINITE ELECTRICAL CONDUCTIVITY ON THE DEVELOPMENT OF A MAGNETICALLY DRIVEN SHOCK IN MGD-(BETA MUCH LESS THAN ONE)-APPROXIMATION,
Innsbruck Univ (Austria) Inst for Theoretical Physics
Helmut Friedel. 23 May 66 11p
AFOSR-67-1226
Contract F61052-67-C-0014
Availability: Published in Zeitschrift fuer Angewandte Mathematik und Physik v18 n1 p85-92 1967.

Descriptors: (*Magnetohydrodynamics, *Electrical conductance), One-dimensional flow, Stability, Differential equations, Magnetic fields, Numerical analysis, Shock waves, Approximation (Mathematics), Austria.

A numerical method for the solution of the parabolically degenerate, one-dimensional, unsteady MGD basic equations containing dissipative terms is given. This method is developed in connection with the theory of characteristics. Using this method the unsteady propagation of a magnetically driven shock is investigated. This numerical computation is based on the MGD basic equations in (Beta much less than one)-approximation including dissipation due to finite magnetic Reynolds number. (Author)
AD-653 329 Not available from CFSTI.

DETERMINATION OF THE GAS TEMPERATURE IN THE AFTERGLOW OF PULSED DISCHARGES BY MICROWAVE PROBING OF STANDING ACOUSTIC WAVES,
Army Electronics Command Fort Monmouth N J Inst for Exploratory Research
Gunthard K. Born, and Rudolf G. Buser. 14 Mar 66, 7p
Availability: Published in Journal of Applied Physics v37 n13 p4918-24 Dec 1966.

Group 20I — Plasma physics

Descriptors: (*Afterglows, Temperature), Gas discharges, Probes (Electromagnetic), Microwaves, Interferometers, Determination, Plasma medium, Langmuir probes.

The time-varying gas temperature of afterglow plasmas is determined from the frequencies of standing acoustic waves which are produced during the breakdown of low-pressure gases (0.1-20 Torr). The sound field is probed with free-space microwave (9 and 70 Gc/sec) interferometers in transmission and reflection. Capacitor discharges are found to heat the gas significantly. The temperature does not decay to room temperature within the observed afterglow periods. (Author)
AD-653 338 Not available from CFSTI.

SOME REMARKS ON THE STABILITY OF HYDROMAGNETIC SHOCK WAVES,
Columbia Univ New York
C. K. Chu. 1967, 19p
AFOSR-67-1263
Contract AF 49 (638)-1254
Availability: Published in Proceedings of Symposia in Applied Mathematics v18 p1-16 1967.

Descriptors: (*Magnetohydrodynamics, *Shock waves), Stability, Numerical analysis, Plasma physics, Equations of motion.

The report summarizes and classifies the various types of magnetohydrodynamic shock waves and describes their stability and structure. Using numerical experiments, the behavior of the shock waves in dissipative media is obtained and the switch-on shock wave is shown to be physically realistic. (Author)
AD-653 359 Not available from CFSTI.

SCALING PARAMETERS FOR LOW DENSITY FLOWING PLASMAS. PART I. ELECTRON BEAM STUDIES OF THE GAS-SURFACE INTERACTION PROCESS. PART II.
Semi-annual technical summary rept., 1 Mar 67,
Toronto Univ (Ontario) Inst for Aerospace Studies
J. H. de Leeuw, and J. B. French. 5 Jun 67, 14p
Contract Nonr-4073 (00)

Descriptors: (*Plasma medium, *Probes), (*Magnetohydrodynamics, Probes), Electron beams, Surfaces, Interactions, Density, Cryopumping, Test methods, Molecular beams, Superaerodynamics, Distribution functions, Langmuir probes, Canada.
Identifiers: Plasma diagnostics.

Work is reported on measurements in the cryopumped plasma tunnel, which extends the capabilities to more rarefied conditions. Work is also reported on electron beam-plasma interactions aimed at developing a new diagnostic technique. Earlier work established the feasibility of using pulsed electron beams to measure molecular velocity distribution functions based on the metastable molecule time-of-flight technique. During the present period, work has proceeded on an intensive quantitative investigation of all aspects of the technique which it is necessary to understand if it is to be used on various gases or in various velocity regimes. Work has also proceeded on an experiment to use this technique to look at the velocities of high energy beam molecules reflected from known surfaces. (Author)
AD-653 366 HC$3.00 MF$0.65

HOT PLASMA IN A CYLINDRICAL WAVEGUIDE.
Revised ed.,
Texas Univ Austin
D. Gary Swanson. 7 Oct 66, 11p
AFOSR-67-1233
Grant AF-AFOSR-766-66
Revision of manuscript submitted 20 Jun 66.
Availability: Published in The Physics of Fluids v10 n2 p428-35 Feb 1967.

Descriptors: (*Plasma medium, Propagation), Waveguides, Cylindrical bodies, Magnetic fields, Boundary value problems, Perturbation theory, Temperature.

An approximate theory for the propagation of waves in a hot plasma in a cylindrical waveguide with an arbitrary axial magnetic field is presented. The boundary value problem is treated by a perturbation expansion in the smallness of the Larmor radius compared to the transverse wavelength. In the limit of zero Larmor radius, only the electromagnetic boundary conditions are important, while acoustic and higher-order boundary conditions appear as corrections. The results to zero order in Larmor radius are found to be formally identical to the cold plasma equations. Mode orthogonality and some limiting cases are also discussed. (Author)
AD-653 374 Not available from CFSTI.

ANNUAL REPORT, JANUARY 1-DECEMBER 31, 1965.
Princeton Univ., N. J. Plasma Physics Lab.
For primary bibliographic entry see Field 18A.
For abstract, see NSA 21 12.
MATT-Q-23 HC$3.00 MF$0.65

MEASUREMENT OF ION AND ELECTRON DENSITIES OF ELECTRON-BOMBARDMENT ION-THRUSTOR BEAM.
National Aeronautics And Space Administration. Lewis Research Center, Cleveland, Ohio.
D. W. Cooper, and P. W. Kuhns. Dec 66, 18p
NASA-TN-D-3761
Contract 129-01-07-04-22

Descriptors: *Electron density profile, *Ion beam, *Langmuir probe, *Thrustor, Beam, Charge, Current, Density, Electron, Engine, Facility, Instrumentation, Interferometer, Ion, Measurement, Microwave, Pnrticle, Plasma, Probe, Profile, Test.

For abstract, see STAR 05 03.
N67-12800 HC$3.00 MF$0.65

SPECTRAL ABSORPTION COEFFICIENTS OF CARBON, NITROGEN, AND OXYGEN ATOMS.
Lockheed Missiles and Space Co., Palo Alto, Calif. Research Lab.
For primary bibliographic entry see Field 20H.
For abstract, see STAR 05 06.
N67-15686 HC$3.00 MF$0.65

ELECTRON-NEUTRAL (ELASTIC) COLLISIONS IN THE METHOD OF SIMULATING ONE-DIMENSIONAL DIODES ON THE COMPUTER FINAL REPORT.
Stanford Univ., Calif. Inst. for Plasma Research.
P. Burger. Dec 66, 35p NASA-CR-84163,
SUIPR-125
Grant NSG-299-63

Descriptors: *Computer simulation, *Elastic collision, *Electron collision, *Neutral particle, Charge, Collision, Computer, Diode, Elastic, Electron, Neutral, Particle, Plasma, Probability, Simulation.

For abstract, see STAR 05 14.
N67-26501 HC$3.00 MF$0.65

INVESTIGATION OF ELECTROCALORIC EFFECTS IN FERROELECTRIC SUBSTANCES STATUS REPORT, SEP. 1, 1966 - FEB. 28, 1967.
Kansas Univ., Lawrence.
28 Feb 67, 23p NASA-CR-84162, SR-6
Grant NSG-575

Descriptors: *Polarization, *Sulfate, *Tartaric acid, Acid, Crystal, Depolarization, Electrode, Glycerine, Single, Vacuum.

For abstract, see STAR 05 14.
N67-26502 HC$3.00 MF$0.65

INVESTIGATION OF CHARGED PARTICLE MOTION IN MAGNETIC TRAPS OF ACUTE GEOMETRY.
Issledovaniye Dvizheniya Zaryazhennykh Chastits V Magnitnykh Lovushkakh Ostrougol'noy Geometrii
National Aeronautics and Space Administration, Washington, D. C.
N. A. Khizhnyak, N. S. Repalov, K. D. Sinelnikov, V. A. Yamnitskiy, and P. M. Zeydlits. Feb 67, 16p NASA-TT-F-10750
Transl. Into English From the Book "fizika Plazmy I Problemy Upravlyayemogo Termoyadernogo Sinteza" Kiev, Izd. Naukova Dumka, 1965 P 388-402

Descriptors: *Charged particle, *Magnetic trap, *Particle motion, Acute, Analysis, Axisymmetry, Charge, Equation, Field, Geometry, Integration, Magnetic, Motion, Numerical, Particle, Trajectory, Trap.

For abstract, see STAR 05 14.
N67-26562 HC$3.00 MF$0.65

A MAGNETIC TRAP WITH A STRONG MAGNETIC FIELD.
Magnitaya Lovushka S Sil'nym Magnitnym Polem
National Aeronautics and Space Administration, Washington, D. C.
YE. S.Borovik, F. I. Busol, V. A. Kovalenko, YE. I.Skibenko, and V. B. Yuferov. Feb 67, 11p
NASA-TT-F-10754
Transl. Into English From the Book "fizika Plazmy I Problemy Upravlyayemogo Termoyadernogo Sinteza" Kiev, Izd. Naukova Dumka, 1965 P 421-431

Descriptors: *Gaseous ionization, *Hydrogen atom, *Ion injection, *Magnetic trap, Atom, Beam, Chamber, Fast, Field, Gaseous, Hydrogen, Injection, Ion, Ionization, Low temperature, Magnetic, Method, Neutral, Particle, Strong, Trap, Vacuum.

For abstract, see STAR 05 14.
N67-26563 HC$3.00 MF$0.65

ELECTRON GAS IN A MAGNETIC FIELD.
Elektronnyy Gaz V Magnitnom Pole
National Aeronnutics and Space Administration, Washington, D. C.
YE. M.Lifshits. May 67, 18p NASA-TT-F-479
Transl. Into English From Zh. Eksperim. Teor. Fiz. (Moscow), V. 7, 1937 P 390-400

Descriptors: *Electron gas, *Kinetic equation, *Magnetic field, *Maxwell distribution, *Relaxation time, Bundle, Charge, Collision, Conductivity, Electron, Energy, Equation, Field, Gas, Interaction, Kinetic, Magnetic, Particle, Relaxation, Thermal, Time, Transition.

For abstract, see STAR 05 14.
N67-26597 HC$3.00 MF$0.65

ON THE USE OF VARIATIONAL METHODS IN STEADY MAGNETOGASDYNAMICS.
Innsbruck Univ. (Austria). Inst. for Theoretical Physics.
F. Cap, and G. Mueller. 21 Nov 66, 18p SR-39,
AFOSR-67-0416
Contract AF 61/052/-675

Descriptors: *Magnetogasdynamics, *Potential theory, *Variation method, Cylinder, Integral,

Magnetohydrodynamics, Method, Potential, Theory, Variation.

For abstract, see STAR 05 14.
N67-26878 HC$3.00 MF$0.65

RESEARCH LABORATORY OF ELECTRONICS QUARTERLY PROGRESS REPORT, PERIOD ENDING 28 FEB. 1967.
Massachusetts Inst. of Tech., Cambridge. Research Lab. of Electronics.
For primary bibliographic entry see Field 9C.
For abstract, see STAR 05 14.
N67-27081 HC$3.00 MF$0.65

DESCRIPTION OF TWO NEW PROBES FOR ENTHALPY AND PRESSURE MEASUREMENTS IN HIGH-TEMPERATURE GASES.
Sonden Zur Messung Von Enthalpie Und Druck Hocherhitzter Gase
Deutsche Versuchsanstalt Fur Luft- Und Raumfahrt, Stuttgart (West Germany). Institut Fur Plasmadynamik.
W. Fischer-schlemm. Mar 67, 53p DLR-FB-67-17, DVL-612
in German, English Summary

Descriptors: *Enthalpy, *High temperature gas, *Pressure probe, Balance, Gas, Generator, Heat, High temperature, Jet, Mass, Measurement, Plasma, Pressure, Probe, Tube.

For abstract, see STAR 05 14.
N67-27200 HC$3.00 MF$0.65

PLASMA RADIATION SHIELDING QUARTERLY PROGRESS REPORT, 24 DEC. 1966 - 23 MAR. 1967.
Avco-everett Research Lab., Everett, Mass.
Mar 67, 9p NASA-CR-84403
Contract NAS8-20310

Descriptors: *Crossed field, *Electron beam, *Particle motion, *Plasma radiation, *Radiation shielding, Beam, Computer, Crossed, Electron, Field, Geometry, Low density, Motion, Particle, Periodic, Plasma, Radiation, Shielding, Stability, Thickness.

For abstract, see STAR 05 14.
N67-27362 HC$3.00 MF$0.65

OPTICAL INTERFEROMETRY OF PLASMA.
Oiticheskaya Interferometriya Plazmy
Akademiya Nauk Sssr, Novosibirsk. Institut Yadernoi Fiziki.
G. G. Dolgov-savelev, V. M. Federov, E. P. Krugiyakov, and V. K. Malinovskii. 1966, 15p NP-16554
in Russian

Descriptors: *Interferometry, *Optical method, *Plasma, Concentration, Electron, Laser, Light, Method, Optical, Permeability, Propagation, Refraction.

For abstract, see STAR 05 14.
N67-27496 HC$3.00 MF$0.65

EFFECT OF THE PROCESS OF IONIZATION ON THE STRUCTURE AND STATE BEHIND A SHOCK WAVE IN A MAGNETIC FIELD.
O Vliyanii Prctsessa Ionizatsii Na Strukturu I Sostoyaniye Za Udarnoy Volnoy V Magnitnom Pole
International Information, Inc., Philadelphia, Pa.
P. L. Gusika, and G. S. Sukhov. Mar 67, 13p NASA-TT-F-10829
Contract NASW-1499
Transl. Into English From Magnitn. Gidrodinam., Akad. Nauk Latv. Ssr (iga), No. 3, 1966 P 45-54

Descriptors: *Ionization, *Magnetohydrodynamic flow, *Shock wave propagation, Effect, Equation, Field, Flow, Fluid, Magnetic, Magnetohydrodynamic, Mechanics, Parameter, Plane, Plasma, Propagation, Shock, Structure, Thermodynamics, Wave.

For abstract, see STAR 05 14.
N67-27532 HC$3.00 MF$0.65

THE PLASMA RADIATION SHIELD - CONCEPT, AND APPLICATIONS TO SPACE VEHICLES.
Avco-everett Research Lab., Everett, Mass.
F. W. French, and R. H. Levy. Apr 67, 96p NASA-CR-84420, AVCO-EVERETT RES. REPT.-258
Contract NAS8-20310
Submitted for Publication

Descriptors: *Plasma radiation, *Radiation shielding, *Space vehicle, Application, Concept, Electric, Electron, Field, Free, Magnetic, Plasma, Radiation, Shielding.

For abstract, see STAR 05 14.
N67-27709 HC$3.00 MF$0.65

A FABRY-PEROT DUOCHROMATOR FOR THE MEASUREMENT OF SMALL WAVELENGTH DISPLACEMENTS OF SPECTRAL LINES,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 18D.
For abstract, see NSA 21 03.
ORNL-4019 HC$3.00 MF$0.65

20J. QUANTUM THEORY

PARTICLES AND SOURCES,
Harvard Univ Cambridge Mass
For primary bibliographic entry see Field 20H.
AD-652 750 Not available from CFSTI.

SOLAR OBLATENESS AND GENERAL RELATIVITY.
Princeton Univ N J Palmer Physical Lab
For primary bibliographic entry see Field 3A.
AD-652 778 Not available from CFSTI.

RAPIDLY DECREASING FORM FACTORS AND INFINITELY COMPOSITE PARTICLES,
Illinois Univ Urbana Dept of Physics
For primary bibliographic entry see Field 20H.
AD-652 827 HC$3.00 MF$0.65

A THEOREM ON SPIN-EIGENFUNCTIONS.
Massachusetts Inst of Tech Lexington Lincoln Lab
For primary bibliographic entry see Field 20H.
AD-652 840 HC$3.00 MF$0.65

GAUGE PROPERTIES OF THE MINKOWSKI SPACE,
Princeton Univ N J Palmer Physical Lab
For primary bibliographic entry see Field 20K.
AD-652 961 Not available from CFSTI.

ANALYTICITY CONSTRAINTS ON UNEQUAL-MASS REGGE FORMULAS,
Princeton Univ N J Palmer Physical Lab
Marvin L. Goldberger, and C. Edward Jones. 27 May 66, 10p
AFOSR-67-1195
Contract AF 49 (638)-1545
Availability: Published in The Physical Review v150 n4 p1269-75 Oct 28 1966.

Descriptors: (*Regge poles, Equations), (*Elastic scattering, Regge poles), Integral equations, Nuclear scattering, Quantum statistics, Particle trajectories.
Identifiers: Analyticity, Mass.

A Regge-pole formula is derived for the elastic scattering of two unequal-mass particles that combines desirable l-plane analytic properties (i.e., a simple pole at l=alpha in the right-half l plane) and Mandelstam analyticity. It is verified that such a formula possesses the standard asymptotic Regge behavior u exp. alpha (s) even in regions where the cosine of the scattering angle of the relevant crossed reaction may be bounded. The simultaneous requirements of l-plane and Mandelstam analyticity enforce important constraints, and the consistency of these constraints is studied. These considerations lead to the appearance of a 'background' term proportional asymptotically to u exp. alpha (0)-1 which has no analog in the equal-mass problem. It is also concluded that a necessary condition for consistency is alpha (infinity) <0. (Author)
AD-652 975 Not available from CFSTI.

DYNAMICAL THEORY OF STRONG INTERACTIONS,
Yeshiva Univ New York Belfer Graduate School of Science
For primary bibliographic entry see Field 20H.
AD-652 976 Not available from CFSTI.

THEORY OF POSITRON ANNIHILATION IN REAL METALS,
Cornell Univ Ithaca N Y Lab of Atomic and Solid State Physics
J. P. Carbotte. 5 Nov 65, 10p
Contract Nonr-401 (38)
Availability: Published in Physical Review v144 n1 p309-18 Apr 8 1966.

Descriptors: (*Positrons, *Annihilation reactions), (*Band theory of solids, Annihilation reactions), Metals, Green's function, Wave functions, Electrons, Atomic energy levels, Sodium, Integrals.

A theory of positron annihilation applicable to real metals is developed. It is based on a band model for a solid and the ladder approximation for the electron-positron Green's function. The Block character of the positron as well as the conduction-band single-particle wave functions are included. The core electrons are treated within the tight-binding approximation. Throughout, the effect of the direct Coulomb coupling between the annihilating pair is stressed. The general formulas are then used to derive a theory of core annihilation. In the course of the derivation it was necessary to make a number of simplifying assumptions which restrict the theory to simple metals. It is found that the contribution to the partial annihilation rate R (p) coming from a core electron is proportional to the square of the sum of two terms: the usual pth Fourier component of the product of the positron and core function plus another term accounting for the polarization of the ion core by he positron. After studying core annihilation in detail using an idealized model for the unoccupied electron Bloch states in sodium, it is concluded that the second term is just as important as the first, although it has never been included in past treatments of this problem. Unfortunately the model is too crude to give quantitative results. An accurate calculation of core annihilation is very much more difficult than the corresponding computation of annihilation in a conduction-electron gas. (Author)
AD-652 979 Not available from CFSTI.

CONSISTENCY OF CURRENT COMMUTATION RELATIONS AND RELAYED CONSIDERATIONS,
Harvard Univ Cambridge Mass Dept of Physics
B. J. Chang, H. T. Nieh, and T. M. Yan. 25 Jun 66, 8p
AFOSR-67-1176
Contract AF 49 (638)-1380

Group 20J—Quantum theory

Availability: Published in IL Nuovo Cimento v45 Ser10 p364-9 Nov 21 1966.

Descriptors: (*Elementary particles, Algebras), (*Mesons, Mathematical models), Vector analysis, Operators (Mathematics), Special functions (Mathematical), Field theory, Quantum statistics.
Identifiers: Commutation relations, Current algebras.

Okubo recently proved the inconsistency of the commutation relation (j-k (x), j-0 (x') = 0, for any local Lorentz vector j-mu (x). In his proof, use is made of the assumption that there are no massless excitations in the physical spectrum. An elementary observation reveals, however, that this assumption is really not necessary. The PS-PV meson theory and the sigma-model are discussed. With a proper definition for the current as localized field operator product, the formal inconsistencies observed by Okubo in these two theoretical models are resolved. (Author)
AD-653 047 Not available from CFSTI.

THE POST-NEWTONIAN EFFECTS OF GENERAL RELATIVITY ON THE EQUILIBRIUM OF UNIFORMLY ROTATING BODIES. III. THE DEFORMED FIGURES OF THE JACOBI ELLIPSOIDS. IV. THE ROCHE MODEL.,
Chicago Univ Ill
For primary bibliographic entry see Field 20D.
AD-653 251 Not available from CFSTI.

TEMPERATURE TRANSFORMATIONS, A 'PRACTICAL' CHOICE,
Rochester Univ N Y Dept of Physics and Astronomy
For primary bibliographic entry see Field 20M.
AD-653 252 Not available from CFSTI.

FINE STRUCTURE OF n=4 LEVELS OF (He4) (+),
Yale Univ New Haven Conn Dept of Physics
For primary bibliographic entry see Field 7D.
AD-653 299 Not available from CFSTI.

MEASUREMENT OF THE QUANTUM-ELECTRODYNAMIC LEVEL SHIFT IN THE n=3 STATE OF (He4) (+).
Yale Univ New Haven Conn Dept of Physics
For primary bibliographic entry see Field 7D.
AD-653 300 Not available from CFSTI.

BIPOLAR EXPANSION OF SCREENED COULOMB POTENTIALS, HELMHOLTZ' SOLID HARMONICS, AND THEIR ADDITION THEOREMS,
Uppsala Univ (Sweden)
Reikichi Nozawa. 3 Jan 66, 23p
AFOSR-67-1243
Contract AF 61 (052)-874
Availability: Published in Journal of Mathematical Physics v7 n10 p1841-60 Oct 1966.

Descriptors: (*Wave functions, Quantum mechanics), Bessel functions, Scattering, Polynomials, Operators (Mathematics), Transformations (Mathematics), Functions, Sweden.
Identifiers: Helmholtz' solid harmonics.

Helmholtz' solid harmonics (spherical Bessel functions X spherical surface harmonics) are generated from fundamental spherical waves through a ladder procedure using raising and lowering operators. The addition theorem for them and the bipolar expansion formula of a screened Coulomb potential are derived. A method for evaluating two-center integrals with a general potential is given in the last section. This is new and useful in practical calculations. A key function which appears in all the essential results, is studied in detail.
AD-653 320 Not available from CFSTI.

LINKED CLUSTER THEOREM AND THE GREEN'S FUNCTION EQUATIONS OF MOTION FOR A MANY-FERMION SYSTEM,
Uppsala Univ (Sweden) Quantum Chemistry Group
Donald H. Kobe. 9 Feb 66, 15p
AFOSR-67-1244
Contract AF 61 (052)-874
Availability: Published in Journal of Mathematical Physics v7 n10 p180620 Oct 1966.

Descriptors: (*Fermions, Equations of motion), Field theory, Theorems, Green's function, Iterations, Perturbation theory, Diagrams, Sweden.

The equations of motion for the general many-time causal Green's functions for a fermion system are iterated and are shown not to lead to unlinked graphs, which is a general proof of the linked cluster theorem. An explicit expression is obtained for the perturbation expansion of an arbitrary Green's functions which is applied to the one and two-particle Green's functions. By connecting lines systematically in a set of diagrams obtained from the equations of motion, the usual topologically different linked graphs and rules are generated. (Author)
AD-653 321 Not available from CFSTI.

BEST ENERGY CRITERION AND THE PRINCIPLE OF COMPENSATION OF DANGEROUS DIAGRAMS,
Uppsala Univ (Sweden) Quantum Chemistry Group
Donald H. Kobe. 11 Apr 66, 23p
AFOSR-67-1281
Contract AF 61 (052)-874
Availability: Published in Annals of Physics v40 n3 p395-414 Dec 1966.

Descriptors: (*Elementary particles, Quantum statistics), (*Nuclear energy levels, Diagrams), Hartree-Fock approximation, Operators (Mathematics), Perturbation theory, Ground state, Wave functions, Field theory.

The compensation of the lowest order dangerous diagram is analogous to a Hartree-Fock procedure to determine the coefficients for the Bogoliubov quasi particles. This procedure is generalized in analogy with the Brueckner extension of the Hartree-Fock procedure by replacing the potential with the reaction operator (t-matrix) to obtain the principle of compensation of dangerous diagrams (PCDD). The PCDD is expanded by time dependent perturbation theory to third order, and it is shown that ladder diagrams are not important. (Author)
AD-653 322 Not available from CFSTI.

ON THE MAGNETOSPHERES OF SELF-GRAVITATING BODIES,
Columbia Univ New York Dept of Astronomy
For primary bibliographic entry see Field 20H.
AD-653 324 Not available from CFSTI.

EVALUATION OF SOME TRANSPORT INTEGRALS. II.
Revised ed.,
Battelle Memorial Inst Columbus Ohio Columbus Labs
M. L. Glasser, and V. E. Wood. 17 May 66, 5p
AFOSR-67-1231
Contract AF-AFOSR-260-66
Revision of manuscript submitted 28 Apr 66. See also AD-641 678.
Availability: Published in Journal of Applied Physics v37 n12 p4364-6 Nov 1966.

Descriptors: (*Integrals, Transport properties), (*Quantum statistics, Integrals), Magnetic fields, Integral transforms, Electrons, Metals, Phonons, Special functions (Mathematical).
Identifiers: Thermo magnetic effects, Riemann Zeta function.

The transport integrals (the integral from 0 to 00 of (x to the lth power) (ax + 1) to the minus one power, (l to the xth power) (e to the xth power, + or - 1) raised to the -2 power, dx) are tabulated and discussed. As an example, application is made to thermomagnetic effects in metals. (Author)
AD-653 375 Not available from CFSTI.

THE EQUILIBRIUM OF SLOWLY ROTATING CONFIGURATIONS IN THE POST-NEWTONIAN APPROXIMATION: CORRECTIONS TO CLAIRAUT'S EQUATION; THE APPEARANCE OF A ROTATING CONFIGURATION AS VIEWED FROM INFINITY.
Chicago Univ Ill
For primary bibliographic entry see Field 20D.
AD-653 376 Not available from CFSTI.

OBJECTIVITY IN QUANTUM MECHANICS,
Yale Univ New Haven Conn Dept of Physics
Henry Margenau, and James L. Park. 1967, 29p
AFOSR-67-1275
Grant AF-AFOSR-843-65
Availability: Published in Delaware Seminar in the Foundations of Physics v1 p161-87 1967.

Descriptors: (*Quantum mechanics, Philosophy), Scientific research, Reasoning, Theory, Probability, Mathematical analysis, Errors, Measurement.

The logical developments in physical sciences of mensuration, observables, reality and invariance are extended to objectivity in quantum mechanics. The historical developments are given in both areas along with analyses of the rolls of the observer, instrumental errors, mathematical manipulation and probability. It is concluded that quantum mechanics is on acceptable grounds if the same care is devoted, as in chemical physics, to objectivity as intersubjectivity, as invariance of aspect and as scientific verfiability. (Author)
AD-653 378 Not available from CFSTI.

GENERALIZED POTENTIALS FOR INELASTIC SCATTERING.
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
H. C. Volkin. May 67, 53p NASA-TN-D-4000
Contract 129-02-07-07-22

Descriptors: *Inelastic scattering, *Nuclear reaction, *Potential theory, Amplitude, Channel, Generalization, Inelasticity, Nuclear, Operator, Optical, Potential, Projection, Reaction, Resonance, Scattering, Set, Theory, Transition, Unified.

For abstract, see STAR 05 14.
N67-26554 HC$3.00 MF$0.65

ON THE THEORY OF COULOMB INTERACTION.
K Teorii Kulonovskogo Vzaimodeystviya
National Aeronautics and Space Administration, Washington, D. C.
I. I. Tugov. May 67, 21p NASA-TT-F-474
Tranrl. Into English From Joint Inst. for Nucl. Res. Rept. No. Jinr-p-2638

Descriptors: *Differential equation, *Group theory, *Momentum, Atom, Attraction, Differential, Discrete, Eigenfunction, Equation, Field, Generator, Group, Hydrogen, Motion, N-dimensional, Number, Problem, Property, Quantum, Scattering, Schroedinger equation, Spectrum, Symmetry, Theory, Wave.

For abstract, see STAR 05 14.
N67-26598 HC$3.00 MF$0.65

CHIRAL ALGEBRA CONDITIONS ON PIN AMPLITUDES.
Istituto Superiore Di Sanita, Rome (Italy). Labo-

ratori Di Fisica.
L. Maiani, and G. Preparata. 1 Mar 67, 13p ISS-67/6

Descriptors: *Group theory, *Matrix algebra, *Neutron decay, *Pion, Algebra, Amplitude, Axis, Beta, Decay, Group, Matrix, Neutron, Particle, Physics, Production, Rule, Sum, Theoretical, Theory, Weak.

For abstract, see STAR 05 14.
N67-27133 HC$3.00 MF$0.65

20K. SOLID MECHANICS

THE DEVELOPMENT OF FREE TURBULENT SHEAR LAYERS.
Arnold Engineering Development Center, Arnold Air Force Station, Tenn.
For primary bibliographic entry see Field 20D.
AD-473 841 HC$3.00 MF$0.65

DEVELOPMENT OF EXPERIMENTAL TESTING PROGRAMS TO VERIFY THERMAL STRESS ANALYSIS.
Final rept., 15 Jun 65-15 May 66,
Ohio State Univ. Research Foundation, Columbus. Dept. of Aeronautical and Astronautical Engineering.
B. E. Gatewood, A. R. Glaser, nnd B. H. Ulrich, Jr. Jun 66, 122p Rept. no. 10
AFFDLTR-66-67
Contract AF 33 (615)-3114

Descriptors: (*Thermal stresses, *Analysis), Experimental data, Tests, Beams (Structural), Tables, Joints, Thermal properties, Strain gages, Theory, Heat, Thermocouples, Temperature, Calibration, Tables, Bibliographies.

The report contains a bibliographical list for test data on thermal stress testing, an evaluation of the reports in the list in a set of tables, and a list of proposed experimental tests to verify certain theoretical method of thermal stress analysis. Six of the proposed test programs, beam test fixture with column test, plate in-plane test fixture with circular plate test, plate bending test fixture redundant truss test, curved beam test, and a joint test with mixed materials, are described in detail. (Author)
AD-486 798 HC$3.00 MF$0.65

LOW AND HIGH AMPLITUDE INTERNAL FRICTION MEASUREMENTS IN SOLIDS AND THEIR RELATION TO IMPERFECTION MOTIONS.
Columbia Univ New York Inst for the Study of Fatigue and Reliability
For primary bibliographic entry see Field 20B.
AD-652 793 HC$3.00 MF$0.65

APPLICATION OF THE MODIFIED REISSNER VARIATIONAL PRINCIPLE TO A CANTILEVER PLATE PROBLEM USING THE TECHNIQUES OF NUMERICAL INTEGRATION AND FINITE DIFFERENCES.
Texas Univ Austin Defense Research Lab
For primary bibliographic entry see Field 13M.
AD-652 798 HC$3.00 MF$0.65

AN EXCITATION AND INSTRUMENTATION SYSTEM FOR VIBRATING PLATE STUDIES.
Texas Univ Austin Defense Research Lab
For primary bibliographic entry see Field 13M.
AD-652 802 HC$3.00 MF$0.65

BALANCING CRITERIA AND THEIR RELATIONSHIP TO CURRENT AMERICAN PRACTICE.
Houston Univ Tex Dept of Mechanical Engineering
For primary bibliographic entry see Field 13I.
AD-652 831 HC$3.00 MF$0.65

FEASIBILITY STUDY OF BURIED ANCHORS IN POLAR SNOW.
Cold Regions Research and Engineering Lab Hanover N H
For primary bibliographic entry see Fiind 8L.
AD-652 869 HC$3.00 MF$0.65

A REPORT GUIDE TO FATIGUE TESTING LITERATURE.
Monograph series,
Army Materials Research Agency Watertown Mass
Charles P. Merhib. May 67, 69p Rept no. AMRA-MS-67-05

Descriptors: (*Fatigue (Mechanics), Tests), Bibliographies, Abstracts, Non-destructive testing, Failure (Mechanics), Test methods, Cracks.

The main objective of the compilation is to provide simple and fast access to information on the subject of fatigue testing and yet provide sufficient information in the form of abstracts and word descriptors to make the listing useful.
AD-652 881 HC$3.00 MF$0.65

ULTIMATE STRENGTH OF CHOPPED WIRE REINFORCED SMALL SCALE MORTAR SLABS.
Protective Structures Development Center Fort Belvoir Va
For primary bibliographic entry see Field 13C.
AD-652 884 HC$3.00 MF$0.65

DISTRIBUTION OF MECHANICAL FORCES IN MAGNETISED MATERIAL AND EVALUATION OF MAGNETIC ENERGY DENSITY IN MAGNETISED MATTER,
Massachusetts Inst of Tech Cambridge Research Lab of Electronics
For primary bibliographic entry see Field 20C.
AD-652 903 Not available from CFSTI.

CONCERNING THE STABILITY OF A FLEXIBLE SHAFT WITH ONE DISK WHEN ACTED UPON BY THE FORCES OF INTERNAL AND EXTERNAL FRICTION AND BY THE WEIGHT OF THE DISK.
Houston Univ Tex Dept of Mechanical Engineering
For primary bibliographic entry see Field 13I.
AD-652 934 HC$3.00 MF$0.65

GAUGE PROPERTIES OF THE MINKOWSKI SPACE,
Princeton Univ N J Palmer Physical Lab
H. A. Kastrup. 19 Apr 66, 13p
AFOSR-67-1192
Contract AF 49 (638)-1545
Availability: Published in The Physical Review v150 n4 p1183-93 Oct 28 1966.

Descriptors: (*Elementary particles, *Conformal mapping), (*Groups (Mathematics), *Field theory), Scattering, Interactions, Invariance, Transformations (Mathematics), Geometry, Matrix algebra, Tensor analysis, Kinematics, Quantum mechanics.

The dilatations and the 4-parameter special conformal group are interpreted as geometrical gauge transformations of the Minkowski space and new arguments are given as to why the conventional interpretation of the special conformal group as a set of transformations connecting systems with constant relative accelerations cannot be true. The dilatations and the special conformal group are considered to be approximate symmetries in particle physics in the sense that they become 'good' groups at very high energies, but are broken for low energies when the rest masses are important. These properties are illustrated in the case of classical point particles by the partially conserved quantities associated with the new symmetries. One of the interesting features is that the transformation by reciprocal radii appears as a new discrete approximate space-time symmetry. This is probably of interest for the problem of P and CP invariance. The geometrical interpretation is analyzed in terms of homogeneous coordinates anu the physical significance of these coordinates is discussed. This analysis leads in a straightforward way to the group 0 (2,4) which is isomorphic to the full 15-parameter conformal group in Minkowski space, including the full Poincare group. A conformal-invariant generalization of the usual notion of Einstein causality is given and analyzed. The relationship between tensors and spinors of the group 0 (2,4) and the usual space-time spinors and tensors is discussed, employing results obtained by Dirac. Finally the field equations for electrodynamics and the pseudoscalar coupling are written down in terms of the new spinors and tensors. These equations do not contain a bare-mass term.
AD-652 961 Not available from CFSTI.

FATIGUE OF STRUCTURAL ELEMENTS. STUDY OF RESIDUAL STRESSES IN LINEARLY VARYING BIAXIAL STRESS FIELDS.
Progress rept. no. 2,
Naval Applied Science Lab Brooklyn N Y
H. V. Cordiano, and V. L. Salerno. 26 Apr 67, 63p

See also AD-620 234.

Descriptors: (*Structural parts, *Fatigue (Mechanics)), (*Steel, Welds), (*Welds, Stresses), Strain (Mechanics), Theory, Measurement.

A theory was developed for the calculation of relaxation strains effected by drilling a hole in a plate with a linearly varying stress field. With this theory a technique was developed for the measurement of residual stresses at the toe of tee fillet welds. The above technique was employed for the measurement of residual stresses at the toe of tee fillet welds in 1-1/2 in. HY-80 steel with the fillet in the as welded, ground, shot-peened, ground and shot-peened, and mechanically-peened condition. It was found that experimental data conforms to the assumed theory, and that residual stresses in as welded tee fillet welds in both the transverse and longitudinal directions approach the yield strength of the steel. It was also found that residual stresses are reduced approximately 25 percent by grinding, 50 percent by shot-peening anu 50 percent by grinding and shot-peening. Mechanical-peening drastically affected residual stresses by converting high tension at the toe of the fillet weld to high compression of approximately the same magnitude. (Author)
AD-653 068 HC$3.00 MF$0.65

TRANSIENT ANALYSIS IN FRACTURING ALUMINUM PLATE.
Technical rept., Apr 66-May 67,
Washington Univ Seattle Dept of Mechanical Engineering
A. S. Kobayashi, and W. L. Engstrom. May 67, 11p Rept no. TR-3A
Contract Nonr-477 (39)

Descriptors: (*Aluminum, *Crack propagation), Fracture (Mechanics), Strain (Mechanics), Optical analysis, Metal plates, Fatigue (Mechanics).
Identifiers: Aluminum alloy 7075, Aluminum alloy 7178, Moire patterns.

Transient displacement distributions in centrally notched aluminum plates with propagating cracks were determined by using the Moire fringe technique. Specimens used were 7075-T6 and 7178-T6 aluminum alloy 4 inches wide, 1/16 inch thick with half crack lengths of 0.12 to 0.25 inches. The transient Moire patterns were recorded with a

Beckman and Whitley Model 501A image converter camera. Crack velocities and crack accelerations were determined by utilizing crack wires. Crack velocities in 7178-T6 specimens were higher than those in 7075-T6 specimens. It was also found that the static and transient normal strain distributions in the region immediately ahead of the crack tip were similar. Also with increasing crack velocities, the order of strain singularity approached the order of r to the -0.5 power as found in a previous investigation (see AD-624 168). It was concluded that for this series of experiments, Craggs' model of a moving crack agreed with the experimental results. (Author)
AD-653 073 HC$3.00 MF$0.65

RATIONAL STRUCTURE OF FORMULAS FOR CALCULATING THE STATISTICAL CHARACTERISTICS OF WAVE LOADS,
Naval Ship Systems Command Washington D C
For primary bibliographic entry see Field 13J.
AD-653 082 HC$3.00 MF$0.65

ON OVERALL BUCKLING OF VESSELS COMPOSED OF COMBINATIONS OF CYLINDRICAL AND SPHERICAL SHELLS.
Technical rept.,
Columbia Univ New York Dept of Civil Engineering and Engineering Mechanics
Azriel Harari. Apr 67, 24p Rept no. TR-42
Contract Nonr-266 (86)

Descriptors: (*Structural shells, *Buckling (Mechanics)), Cylindrical bodies, Spheres, Underwater, Loading (Mechanics), Differential equations.

The objective is the determination of the overall buckling load of submerged vessels consisting of combinations of spherical and cylindrical shells. The overall buckling load does not depend substantially on bending effects, such that membrane equations suffice for the purpose of overall buckling. The appropriate differential equations and continuity conditions are derived from the principle of stationary potential energy. (Author)
AD-653 114 HC$3.00 MF$0.65

A NUMERICAL SOLUTION FOR LONGITUDINAL WAVES IN A CYLINDRICAL SHELL.
Technical rept.,
Columbia Univ New York Dept of Civil Engineering and Engineering Mechanics
R. B. Testa. Apr 67, 16p Rept no. TR-41
Contract Nonr-266 (86)

Descriptors: (*Elastic shells, Impact), (*Cylindrical bodies, Impact), Numerical analysis, Membranes.

An explicit and rapidly convergent numerical scheme is presented for the solution of the longitudinal impact of a cylindrical, elastic, membrane shell. The response previously obtained by another numerical procedure is reproduced with much shorter computation times, and the numerical solution is extended to larger values of time after impact. (Author)
AD-653 115 HC$3.00 MF$0.65

RESONANCE CURVE ANALYSIS.
Special rept.,
Cold Regions Research and Engineering Lab Hanover N H
R. K. Bernhard. Mar 67, 41p Rept no. CRREL-SR-97

Descriptors: (*Resonance, Analysis), (*Mechanical properties, Solids), Wave transmission, Soils, Snow, Vibration, Mechanical waves, Motion, Stresses, Mathematical analysis, Numerical methods and procedures.

Resonance curves, defining the relation between displacement, velocity, or power and exciter frequency are analyzed. A distinction is made between excitation by sinusoidal force vectors of constant amplitude and by vectors whose amplitudes increase with the square of the frequency. Both types are applied to one-degree-of-freedom systems with linear characteristics. Evaluation of these resonance curves to determine dynamic responses is discussed and followed up by some practical applications. (Author)
AD-653 144 HC$3.00 MF$0.65

AN EXPERIMENTAL INVESTIGATION OF FRANGIBLE PLATE FRAGMENTATION.
Final summary rept.,
IIT Research Inst Chicago Ill
Theodore Liber, and Ralph L. Barnett. Oct 66, 106p
Contract OCD-PS-64-50

Descriptors: (*Structural parts, Fragmentation), Loading (Mechanics), Brittleness, Drop testing, Fracture (Mechanics), Statistical analysis, Crack propagation, Stresses.
Identifiers: Plates (Mechanical).

The fragmentation of dynamically loaded homogeneous brittle plates was studied by means of a drop test facility. Multiple tests were conducted on five different size model plaster plates under two loading conditions. The results indicated that the plate response is statistical in nature and that a definite fracture pattern emerges. Furthermore, they give rise to the working hypothesis that the cracks propagate along the maximum stress trajectories associated with the forced vibration mode. (Author)
AD-653 162 HC$3.00 MF$0.65

ROCK DEFORMATION AND THE DEFORMATION MECHANISMS IN TORSION TESTS.
Shell Development Co Houston Tex
For primary bibliographic entry see Field 8G.
AD-653 198 Not available from CFSTI.

NONSYMMETRIC BUCKLE PATTERNS IN PROGRESSIVE PLASTIC BUCKLING,
Stanford Univ Calif Dept of Aeronautics and Astronautics
W. H. Horton, S. C. Bailey, and A. M. Edwards. 1966, 14p
AFOSR-67-1269
Contracts AF 49 (638)-1495, DA-44-177-AMC-115 (T)
Presented at SESA Spring Meeting (1965) held in Denver, Colo., 5-7 May 65.
Availability: Published in Experimental Mechanics 12p Sep 1966.

Descriptors: (*Structural shells, Buckling (Mechanics)), (*Cylindrical bodies, Buckling (Mechanics)), Plasticity, Compressive properties, Loading (Mechanics), Stability.

The paper presents the results of a series of experiments on the progressive plastic buckling of cylindrical shells under axial compressive load. It shows that, for shell bodies with an R/t less than 100, the normal axisymmetric ring buckling will develop into nonsymmetric patterns. It is demonstrated that there exists also a class of shells within this thickness-radius range for which nonsymmetric plastic buckling always occurs without the prior formation of a ring. It appears from the limited number of tests made that, for a particular R, R/t, material and rate of loading, there is a critical value of L, above which there is a high probability of the buckle pattern developing in a nonsymmetric fashion. It seems probable, too, that there are bands of R/t for a particular L/R, R, material and rate of loading for which the buckle number will be constant. The experiments tend to indicate that the postbuckling efficiency of the shell decreases with increasing buckle number. (Author)
AD-653 281 Not available from CFSTI.

SOLUTION OF THE RESTRICTED PROBLEM OF THREE BODIES BY POWER SERIES,
Yale Univ New Haven Conn Observatory
Victor Szebehely. 12 Aug 66, 10p
AFOSR-67-1251
Grant AF-AFOSR-397-67
Availability: Published in Astronomical Journal v71 n10 p968-75 Dec 1966.

Descriptors: (*N-body problem, *Coriolis effect), (*Lunar trajectories, *Equations of motion), Convergence, Integration, Power series, Velocity, Transformations (Mathematics), Stability, Polynomials, Problem solving, Mathematical prediction.

Solutions in the form of Taylor series are presented using the regularization method of Thiele-Burrau. The general terms in the series are found as functions of the mass parameter and of the initial conditions. The argument of the expansion is the regularizing independent variable, the new time. In addition to giving the general formulas, the first eight terms of the series are computed for a collision orbit. The coefficients of the series depend only on the Jacobian constant, on the mass parameter, and on the direction of the initial velocity vector. Applicability of the results besides the analytic aspects, are in the numerical integration of the restricted problem with Steffensen's method where polynomial predictions are used. The regularized series solution may be either continued analytically from one primary to the next or may be made convergent for all times by Poincare's transformation. In this sense an analytic approach to the finding of 'lunar trajectories' is offered, inasmuch as the solution given encompasses all possible initial conditions, and the series is convergent for all times.
AD-653 301 Not available from CFSTI.

SOME RESULTS ON FINITE SEMIGROUPS,
California Univ Berkeley
John Rhodes. 8 Sep 65, 37p
AFOSR-67-1274
Contract Nonr-4705 (00), Grant AF-AFOSR-848-65
Availability: Published in Journal of Algebra v4 n3 p471-504 Nov 1966.

Descriptors: (*Machines, Torsion), (*Combinatorial analysis, Theorems), Mapping (Transformations), Identification systems, Theorems, Groups Mathematics), Functional analysis, Theorems, Green's function.

The work states and proves various propositions about finite semigroups. Nearly all of these results were discovered during a seminar entitled 'Finite Semigroups and Machines' given at the University of California at Berkeley, 1964-1965. In general, the proofs are applications of standard semigroup theory, particularly the Green relations and the Rees theorem.
AD-653 310 Not available from CFSTI.

TRANSIENT AND HARMONIC RESPONSES OF A PLATE WITH AN ATTACHED VISCOELASTIC LAYER,
Applied Technology Associates Inc Ramsey NY
L. W. Jones, V. L. Salerno, and M. Morduchow. Apr 67, 49p Rept no. ATA-115
Contract N00014-66-C-0028

Descriptors: (*Metal plates, *Viscoelasticity), Motion, Damping, Vibration, Thickness, Theses, Performance (Engineering), Relaxation time, Fourier analysis, Integral transforms, Elasticity, Harmonic analysis, Differential equations, Coatngs.

The principle of elastic-viscoelastic analogy is applied to a differential equation for a two-layered plate. The results are response formulas for the

transverse motion of a rectangular simply supported elastic plate with a viscoelastic damping layer attached. Expressions are given for both transient response and steady-state harmonic response. As special cases, formulas are derived for the response to step forces and for a concentrated force at the center. Numerical examples are included.
AD-653 312 HC$3.00 MF$0.65

THE ANALYSIS OF EXPERIMENTAL DATA OBTAINED FROM STABILITY STUDIES ON ELASTIC COLUMN AND PLATE STRUCTURES.
Stanford Univ Calif Dept of Aeronautics and Astronautics
W. H. Horton, F. L. Cundari, and R. W. Johnson.
3 Nov 66, 14p
AFOSR-67-1259
Contracts AF-49 (638)-1495, DA-44-177-AMC-258 (T)
Availability: Published in Israel Journal of Technology v5 n1/2 p104-13 1967.

Descriptors: (*Beams (Structural), Stability), (*Structural parts, Stability), Elasticity, Experimental data, Aeroelasticity.
Identifiers: Plates (Mechanical).

The paper coordinates and extends the researches of some twenty engineers made over a century and a half. It demonstrates the power and versatility of the method of expressing the given hyperbolic equation in a linear form-by change of variables-and determining the classic critical load as the slope of this line. The results obtained show that there can be no doubt as to the applicability of the method to all linear instability problems of plates. Thus it corrects the statements of previous researchers who have been hampered in their work by the lack of valid experiments arising from the coarseness of measurement techniques. There is clear indication that continued study will open door to a clearer understanding of the perplexing questions which arise in compressive elements in which curvature is present. (Author)
AD-653 326 Not available from CFSTI.

INVESTIGATION OF THE NATURE OF STRUCTURAL DAMAGE IN METAL-FORMING PROCESSES.
General Electric Co Schenectady N Y Research and Development Center
For primary bibliographic entry see Field 13H.
AD-653 361 HC$3.00 MF$0.65

ON THE STEADY STATE THERMAL STRESSES IN CYLINDRICAL FUEL PINS DUE TO AXIAL VARIATIONS IN THEIR INTERNAL HEAT-GENERATION RATE.
Argonne National Lab., Ill.
For primary bibliographic entry see Field 18I.
For abstract, see NSA 21 12.
ANL-7263 HC$3.00 MF$0.65

LONGITUDINAL DYNAMICS OF LIQUID FILLED ELASTIC SHELLS.
Southwest Research Inst., San Antonio, Tex. Dept. Of Mechanical Sciences.
D. D. Kana. 30 Sep 66, 41p NASA-CR-79725
Contract NAS8-11045

Descriptors: *Bubble, *Elastic shell, *Liquid-filled shell, *Surface stability, Bulkhead, Compressibility, Coupling, Dynamics, Elastic, Fill, Fluid, Instability, Interaction, Linear, Liquid, Loading, Longitudinal, Low gravity, Nonlinear, Pressure, Resonance, Response, Shell, Stability, Structural, Support, Surface, Tank.

For abstract, see STAR 05 03.
N67-12909 HC$3.00 MF$0.65

CRATERING IN LOW-DENSITY TARGETS.
Utah Research and Development Co., Inc., Salt Lake City.
E. T. Cannon, and G. H. Turner. May 67, 19p
NASA-CR-798
Contract NASW-1196

Descriptors: *Cratering, *Hypervelocity projectile, *Target penetration, Aluminum, Flexible, Foam, Glass, Hypervelocity, Low density, Magnesium, Mass, Nylon, Penetration, Polyurethane, Projectile, Pumice, Rigid, Steel, Target.

For abstract, see STAR 05 14.
N67-26555 HC$3.00 MF$0.65

GENERATION OF LONG TIME CREEP DATA ON REFRACTORY ALLOYS AT ELEVATED TEMPERATURES QUARTERLY REPORT, 26 MAR. - 26 JUN. 1966.
TRW Equipment Labs., Cleveland, Ohio. Materials Research and Development Dept.
For primary bibliographic entry see Field 11F.
For abstract, see STAR 05 14.
N67-26634 HC$3.00 MF$0.65

THE INFLUENCE OF STRAIN RATE AND STRAIN AGEING ON THE FLOW STRESS OF COMMERCIALLY PURE ALUMINUM.
Israel Inst. of Tech., Haifa. Material Mechanics Lab.
For primary bibliographic entry see Field 11F.
For abstract, see STAR 05 14.
N67-26676 HC$3.00 MF$0.65

AN INVESTIGATION INTO THE FATIGUE PROPERTIES OF A SINGLE SPOT WELD LAP JOINT.
College of Aeronautics, Cranfield (England).
L. M. Gourd, J. E. Jubb, and A. Younger. Mar 66, 26p COA-MAT-1

Descriptors: *Fatigue life, *Lap joint, *Sheet metal, *Spot welding, Crack, Depth, Fatigue, Joint, Lap, Life, Load, Metal, Propagation, Property, Resistance, Separation, Sheet, Spot, Steel, Strength, Tensile, Welding.

For abstract, see STAR 05 14.
N67-27127 HC$3.00 MF$0.65

THE EFFECT OF EDGE CONSTRAINT ON THE BUCKLING OF SANDWICH AND RING-STIFFENED 120 DEGREE CONICAL SHELLS SUBJECTED TO EXTERNAL PRESSURE.
Aeronutronic, Newport Beach, Calif.
G. A. Cohen. May 67, 27p NASA-CR-795
Contract NAS1-5554

Descriptors: *Buckling, *Edge loading, *Pressure effect, *Shell stability, Aluminum, Body, Conical, Dynamics, Edge, Effect, Entry, External, Loading, Magnesium, Mechanics, Monocoque, Planetary, Pressure, Sandwich, Shell, Stability, Strength, Truncation, Uniform.

For abstract, see STAR 05 14.
N67-27270 HC$3.00 MF$0.65

DAMPING BEHAVIOR OF DE HAVILLAND STEAM BOOMS.
National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
J. E. Jellison, R. E. Predmore, and C. L. Staugaitis. Jun 67, 17p NASA-TN-D-3996
Contract 735-821-21-75-01

Descriptors: *Boom, *Vibration damping, Damping, Decay, Frequency, Friction, Gauge, Internal, Metal, Photography, Rate, Stem, Storage, Strain, Structural, Vibration.

For abstract, see STAR 05 14.
N67-27290 HC$3.00 MF$0.65

APPLICATION OF THE METHODS OF LIMIT ANALYSIS TO THE EVALUATION OF THE STRENGTH OF FIBER-REINFORCED COMPOSITES.
General Electric Co., Philadelphia, Pa. Missile and Space Div.
For primary bibliographic entry see Field 11D.
For abstract, see STAR 05 14.
N67-27421 HC$3.00 MF$0.65

TRANSMISSION OF CONCENTRATED STRESSES TO A THIN WALLED SHELL.
O Peredache Sosredotochennykh Sil Na Tonko-Stennuyu Obolochku
International Information, Inc., Philadelphia, Pa.
S. M. Chernyakov, and V. I. Feodosyev. Mar 67. 12p NASA-TT-F-10742
Contract NASW-1499
Transl. Into English From Inzh. Zh. (USSR), No. 6, 1966 P 57-63

Descriptors: *Contact, *Stress propagation, *Thin walled shell, Clamp, Decrease, Force, Insert, Limit, Propaga tion, Radial, Region, Rib, Shell, Strength, Stress, Structure, Support, Theory, Thin, Transmission, Wall.
For abstract, see STAR 05 14.
N67-27534 HC$3.00 MF$0.65

DESIGN OF THE CYLINDRICAL SHELL FOR CYCLIC LOADING.
International Information, Inc., Philadelphia, Pa.
For primary bibliographic entry see Field 13M.
For abstract, see STAR 05 14.
N67-27535 HC$3.00 MF$0.65

ON THE OPTIMAL STABILIZATION OF THE ROTATING MOTION OF A SOLID WITH A FIXED POINT BY MEANS OF FLYWHEELS.
Ob Optimal'noy Stabilizatsii Vrashchatel'nogo Dvizheniya Tverdogo Tela S Nepodvizhnoy Tochkoy Pri Pomoshchi Makhovikov
International Information, Inc., Philadelphia, Pa.
U. V. Krementulo. Mar 67, 13p NASA-TT-F-10739
Contract NASW-1499
Transl. Into English From Inzh. Zh. (Moscow), No. 6 , 1966 P 11-18

Descriptors: *Flywheel, *Rotating body, *Stabilization, Axis, Body, Center, Equilibrium, Fixed, Gravity, Inertia, Motion, Point, Position, Rotation, Solid.

For abstract, see STAR 05 14.
N67-27569 HC$3.00 MF$0.65

A MULTIMODULUS ELASTICITY THEORY.
K Raznomodul'noy Teorii Uprugosti
Farnham (Frank C.) Co., Philadelphia, Pa.
S. A. Ambartsumyan, and A. A. Khachatryan. May 67, 8p NASA-TT-F-10986
Contract NASW-1497
Transl. Into English From Mekhan. Tverdogo Tela (USSR), No. 6, 1966 P 64-67

Descriptors: *Compression buckling, *Dynamic modulus, *Elasticity, Body, Buckling, Component, Compression, Dynamic, Energy, Extension, Force, Internal, Isotropy, Linear, Material, Modulus, Potential, Strain, Stress, Theory.

For abstract, see STAR 05 14.
N67-27610 HC$3.00 MF$0.65

NUMERICAL ANALYSIS OF AXIALLY SYMMETRIC SPHERICAL SHELLS.
Mcgill Univ., Montreal (Quebec). Dept. of Civil Engineering and Applied Mechanics.
P. J. Harris. Feb 67, 21p EIC-67-BR + STR-2
Its Vol. 10, No. A-1

Descriptors: *Axisymmetric body, *Differential equation, *Displacement, *Numerical analysis, *Spherical shell, Analysis, Axial, Body, Difference, Differential, Elastic, Equation, Equilibrium, Finite, Numerical, Shell, Spherical, Stability, Stress, Symmetry.

For abstract, see STAR 05 14.
N67-27766 HC$3.00 MF$0.65

A STUDY OF THE DYNAMIC STABILITY OF CONTINUOUS ELASTIC SYSTEMS BY LIAPUNOV'S DIRECT METHOD,
California Univ., Berkeley. Coll. of Engineering.
R. H. Plaut. May 67, 137p AM-67-3
Grant NSF-GK-781

Descriptors: (*Structural parts, Elasticity), Stability, Structural shells, Dynamics, Loading (Mechanics), Panels (Structural).
Identifiers: Lyapunov method.

The systems considered are continuous and autonomous, and include columns, arches, plates, and shallow shells. Some nonlinear and nonconservative problems are treated. One-dimensional systems are considered first. The dynamic stability of columns with various end conditions under axial loading is examined. Then necessary and sufficient stability conditions are found for a simply-supported arch and a clamped arch under distributed static loads. The nonconservative problem of a curved panel in an airstream also is investigated and a sufficient condition for stability is established. Two-dimensional systems are studied next. Stability criteria are derived for rectangular, simply-supported plates and curved panels. It is shown that if a plate is stable under a set of uniform bi-axial forces, then a shallow curved panel with the same demensions and flexural rigidity would also be stable under those forces. Necessary and sufficient stability conditions are obtained for plates and cylindrical panels, plus a sufficient condition for a cylindrical panel in an airstream. Clamped systems which are investigated include plates and shallow shells under uniform normal forces at the edges. (Author)
PB-174 799 HC$3.00 MF$0.65

20L. SOLID STATE PHYSICS

NONTRANSIENT NUCLEAR REACTORS EXPERIMENTS ON POWER TRANSISTORS,
Army Electronics Labs., Fort Monmouth, N. J.
For primary bibliographic entry see Field 18M.
AD-227 715 HC$3.00

CONSIDERATIONS IN THE MEASUREMENT OF CRYOPUMPING CAPTURE COEFFICIENTS,
Arnold Engineering Development Center, Arnold Air Force Station, Tenn.
J. D. Haygood, and J. P. Dawson. Apr 65, 34p
AEDC-TR-65-68
Contract AF 40 (600)-1200
Prepared in cooperation with ARO, Inc., Tullahoma, Tenn.

Descriptors: (*Cryopumping, *Measurement), Calibration, Temperature, Design, Theory, Tests.

A survey is presented of the more important practical and theoretical relationships involved in the study of cryopumping. Starting with a rigorous definition of the capture coefficient, the effects of temperature on the measured values are derived. Several practical points in the design of a chamber for cryopumping measurements are given, including cryosurface and gage placement, calibration, effects of outgassing and impurities, and temperature measurements. (Author)
AD-461 132 HC$3.00

MAGNETIC PROPERTIES AND ELECTRONIC STRUCTURE OF LANTHANUM HYDRIDES,
Louisville Univ Ky Dept of Chemistry
William G. Bos, and H. S. Gutowsky. 10 Oct 66, 4p
Grant NSF-GP-4973
Prepared in cooperation with Illinois Univ., Urbana. Noyes Chemical Lab. Research supported in part by NONR. Prepared for presentation at the Southeastern Regional Meeting of the American Chemical Society (18th), Louisville, Ky., Oct 1966.
Availability: Published in Inorganic Chemistry v6 n3 p552-5 Mar 1967.

Descriptors: (*Lanthanum compounds, *Band theory of solids), (*Hydrides, Chemical bonds), Nuclear magnetic resonance, Magnetic properties, Atomic orbitals, Nuclear spins.
Identifiers: Lanthanum hydrides.

Previously, the nuclear magnetic properties of the lanthanum hydrides have been interpreted in terms of a protonic model while the bulk susceptibilities have been attributed to a hydridic structure. The experimental results and their theoretical relation to the electronic structure are discussed. A simple band model is used to show that the hydridic structure also can account for the magnetic resonance results. Application of the band model to other metallic hydrides is considered briefly. (Author)
AD-652 716 Not available from CFSTI.

NONLINEAR MAGNETO-OPTICS OF ELECTRONS AND HOLES IN SEMICONDUCTORS AND SEMIMETALS,
Massachusetts Inst of Tech Cambridge National Magnet Lab
Benjamin Lax, Wlodzimierz Zawadzki, and Margaret H. Weiler. 29 Dec 66, 4p
AFOSR-67-1126
Contract F44620-67-C-0047
Availability: Published in Physical Review Letters v18 n12 p462-4 Mar 20 1967.

Descriptors: (*Band theory of solids, Models (Simulations)), (*Plasma medium, *Semiconductors), Magnetic fields, Resonance, Electrons, Graphite, Carriers (Semiconductors), Lasers, Bismuth, Lead compounds, Magneto-optic effect, Indium antimonides.

Nonlinear behavior of conduction and valence electrons in semiconductors and semimetals due to nonparabolic or warped energy bands exhibits resonance behavior in magnetic fields which increases the nonlinear excitation by many orders of magnitude for intraband and interband transitions. Higher harmonics generated by the electrons in warped parabolic energy surfaces are linear in electric field at high powers of incoming radiation. (Author)
AD-652 770 Not available from CFSTI.

THEORY OF DIFFUSION INSTABILITIES IN SEMICONDUCTORS,
Royal Inst of Tech Stockholm (Sweden) Microwave Dept
K. Blotekjaer. 1 Jan 67, 66p Rept no. Scientific-12
RADC-TR-67-321
Contract AF 61 (052)-895

Descriptors: (*Semiconductors, Stability), (*Carriers (Semiconductors), Diffusion), Transport properties, Electric fields, Potential scattering, Propagation, Microwave frequency, Theory, Sweden.

A possible mechanism for instabilities in semiconductors is considered. If carrier temperature gradients become large and directed opposite to the density gradients the net diffusion of carriers is reversed, and instabilities may arise. Suitable conditions for the instability are obtained in intrinsic or nearly intrinsic semiconductors at electric field strengths which are sufficiently high to raise the electron temperature to two or three times the lattice temperature. The temperature dependence of the collision frequency has a profound influence on the instability. Suitable materials are those with optical phonon scattering as the dominant collision process, whereas deformation potential scattering suppresses the instability. The maximum frequency for which the instability occurs is of the order of mu-p/ (mu-n) (tau-n), where mu-n and mu-p are the electron and hole mobilities and tau-n is the energy relaxation time of electrons. In polar semiconductors this frequency may be well into the microwave region. (Author)
AD-652 834 HC$3.00 MF$0.65

THE INFLUENCE OF ENERGY-DEPENDENT RELAXATION TIMES AND CHARGE CARRIER MASS ON IONIZATION WAVES IN PLASMAS,
Royal Inst of Tech Stockholm (Sweden) Microwave Dept
Bengt Andersson. 1 Feb 67, 38p Rept no. Scientific-16
RADC-TR-67-322
Contract AF 61 (052)-895

Descriptors: (*Plasma medium, Gas ionization), Relaxation time, Dielectric properties, Indium alloys, Antimony alloys, Semiconductors, Stability, Carriers (Semiconductors), Sweden.

The earlier theory for ionization waves in plasmas, where the dielectric relaxation time is very short, is developed to include energydependent relaxation times and mass of the charge carriers. The energydependence in many cases has a considerable influence and may also change the nature of the instabilities earlier predicted. An application to InSb is made. In the last section also the influence of a finite dielectric relaxation time is considered. Within the approximation used the influence is small except for giving rise to another mode corresponding to decay of free charge. An application to intervalley scattering in the double valley conduction band of semiconductors is made and a condition for a negative resistance instability is given. (Author)
AD-652 839 HC$3.00 MF$0.65

ACOUSTICAL ACTIVITY AND RELATED PHENOMENA IN CRYSTALS.
Pennsylvania Univ Philadelphia Dept of Physics
For primary bibliographic entry see Field 20A.
AD-652 935 HC$3.00 MF$0.65

PARAMAGNETIC-RESONANCE STUDY OF THE DYNAMIC JAHN-TELLER EFFECT IN CaF2:Sc (2+) AND SrF2:Sc (2+),
Texas Instruments Inc Dallas
U. T. Hoechli, and T. L. Estle. 5 Dec 66, 4p
AFOSR-67-1203
Contract AF 49 (638)-1250
Availability: Published in Physical Review Letters v18 n4 p128-30 Jan 23 1967.

Descriptors: (*Scandium, *Paramagnetic resonance), Calcium fluorides, Strontium compounds, Fluorides, Impurities, Hyperfine structure, Atomic orbitals, Atomic energy levels.
Identifiers: Strontium fluoride.

Sc (2+) impurities in CaF2 and SrF2 were studied by electron paramagnetic resonance. The Sc (2+) has an (Ar)3d1 configuration and undergoes a Jahn-Teller distortion. The vibronic states for the equivalent tetragonal distortions couple to give an inversion splitting of roughly 10/cm. (Author)
AD-652 956 Not available from CFSTI.

DETECTION OF TWO INTERNAL MAGNETIC FIELDS IN Fe3 (PO4)2.4H2O,
Boston Univ Mass Dept of Physics
S. Chandra, and G. R. Hoy. 27 Feb 67, 5p

AROD-6338:3
Grant DA-ARO (D)-31-124-G808
Availability: Published in Physics Letters v24A n7 p377-8 Mar 1967.

Descriptors: (*Iron compounds, *Mossbauer effect), (*Phosphates, *Hyperfine structure), Magnetic fields, moments, Quadrupole moments, Electric fields.
Identifiers: Ludlamite, Ferrous phosphate.

Mossbauer studies of Fe3 (PO4)2.4H2O (Tc=15K) show two effective hyperfine fields having magnitudes 362 kG and 203 kG. All other parameters describing the hyperfine and quadrupole interactions are given including the electric field gradients and relative orientations. (Author)
AD-652 962 Not available from CFSTI.

HARTREE-FOCK APPROXIMATION TO THE HEISENBERG ANTI-FERROMAGNET,
Ohio State Univ Columbus Dept of Physics
For primary bibliographic entry see Field 20C.
AD-652 984 Not available from CFSTI.

SUPERCONDUCTIVITY OF LANTHANUM AND LANTHANUM COMPOUNDS AT ZERO AND HIGH PRESSURE.
California Univ San Diego La Jolla
For primnry bibliographic entry see Field 20C.
AD-652 990 Not available from CFSTI.

SUPERCONDUCTIVITY OF ALPHA-URANIUM AND URANIUM COMPOUNDS AT HIGH PRESSURE,
California Univ San Diego La Jolla Dept of Physics
For primary bibliographic entry see Field 20C.
AD-652 993 Not available from CFSTI.

LOW-ENERGY ELECTRON DIFFRACTION STUDIES OF EPITAXIAL GROWTH OF SILVER AND GOLD IN ULTRAHIGH VACUUM,
Cornell Univ Ithaca N Y Dept of Engineering Physics
P. W. Palmberg, T. N. Rhodin, and C. J. Todd.
27 Dec 66, 4p
AFOSR-67-1173
Grant AF-AFOSR-876-65
Availability: Published in Applied Physics Letters v10 n4 p122-4 Feb 15 1967.

Descriptors: (*Silver, Epitaxial growth), (*Gold, Epitaxial growth), (*Epitaxial growth, Electron diffraction analysis), Metal films, Substrates, Crystal structure, Electron bombardment, Crystal lattice defects, Nucleation.

The occurrence of epitaxial growth of single-crystal films of silver and gold was found to depend critically on exposure of the substrate surface to an electron beam prior to deposition. Single-crystal films with a (100) parallel to (100), (100) parallel to (100) orientation were produced on irradiation surfaces at low supersaturation levels in the absence of contaminating gases. It is proposed that the controlled production of point defects on the clean surface play a critical role in the nucleation and growth required for epitaxy. (Author)
AD-653 055 Not available from CFSTI.

SELF-DIFFUSION IN NEAR-EQUIATOMIC ORDERED Au-Cd ALLOYS.
Doctoral thesis,
Illinois Univ Urbana Materials Research Lab
D. Gupta, D. Lazarus, and D. S. Lieberman. 31 May 66, 9p
AFOSR-67-1171, COO-1198-369
Contract AT (11-1)-1198, Grant AF-AFOSR-900-65
Availability: Published in Physical Review v153 n3 p863-72 Jan 15 1967.

Descriptors: (*Gold alloys, Diffusion), (*Cadmium alloys, Diffusion), (*Single crystals, Tracer studies), Radioactive isotopes, Gold, Cadmium, Band theory of solids, Crystal substructure, Heat of activation, Crystal lattice defects.

Self-diffusion measurements in near-equiatomic ordered Au-Cd alloy single-crystal specimens having 47.5, 49.0, and 50.5 at.% Cd nominal composition were made over a temperature range of 353-598C, using Cd109, Cd115, and Au195 radioactive tracers and sectioning techniques. A differential counting method made possible direct measurement of the ratio of diffusivities of Cd to Au to within a few percent, following simultaneous diffusion of Au195 and Cd109 tracers in the same specimen. The experimental determination of this ratio as a function of composition and temperature furnishes strong evidence for a diffusion mechanism in beta ordered alloys by a correlated sequence of six atom-vacancy jumps. (Author)
AD-653 058 Not available from CFSTI.

THE REFLECTANCE OF THE INTERMETALLIC COMPOUNDS NiAl AND CoAl,
Northwestern Univ Evanston Ill Dept of Materials Science
For primary bibliographic entry see Field 20F.
AD-653 059 Not available from CFSTI.

SUPERCONDUCTING TRANSITIONS IN BODY-CENTERED CUBIC THALLIUM-INDIUM ALLOYS,
California Univ San Diego La Jolla Dept of Physics
H. L. Lue, and R. H. Willens. 6 Jun 66, 4p
AFOSR-67-1237
Grant AF-AFOSR-631-64
Prepared in cooperation with California Inst. of Tech., Pasadena, W. M. Keck Labs.
Availability: Published in Physical Review v154 n2 p436-8 Feb 10 1967.

Descriptors: (*Superconductors, Transition temperature), (*Thallium alloys, Superconductivity), (*Indium alloys, Superconductivity), Crystal structure, Crystal lattices, Phase studies, Thermal expansion, Quenching (Cooling), Annealing.

The superconducting transition temperature and the lattice parameter of the body-centered cubic phase in the In-Tl system are reported. The transition temperature of bcc-Tl is extrapolated to be 3.0 plus or minus 0.1K. The linear thermal-expansion coefficient of the bcc alloys is computed to be 0.0000029/deg.K between 77 and 300 K independent of composition. (Author)
AD-653 088 Not available from CFSTI.

QUARTERLY STATUS REPORT NO. 105, 1 JANUARY THROUGH 31 MARCH 1967.
Stanford Univ Calif Stanford Electronics Labs
For primary bibliographic entry see Field 20I.
AD-653 095 HC$3.00 MF$0.65

ELECTRON SHIELDING IN n-InSb.
Technical rept. no. 3, 1 Jun 66-31 May 67,
Colorado Univ Boulder Dept of Physics and Astrophysics
S. P. Li, W. F. Love, and S. C. Miller. Jun 67, 13p
Contract Nonr-1147 (12)

Descriptors: (*Indium antimonides, Band theory of solids), Solid state physics, Impurities, Wave functions, Theses, Magnetic fields, Ionization, Electrons.

The effect on bound electrons in donor levels by conduction band electrons in n-InSb is investigated using a self-consistent calculation. Results of the calculations show that no bound state exists for impurity concentrations greater than 6 x 10 to the 13th power per cubic centimeter. This shielding appears to be the predominant effect leading to the lack of impurity binding energy. (Author)
AD-653 107 HC$3.00 MF$0.65

RADIATION DAMAGE IN SOLIDS: COMPILATION OF ABSTRACTS,
Library of Congress Washington D C Aerospace Technology Div
For primary bibliographic entry see Field 18H.
AD-653 185 HC$3.00 MF$0.65

INVESTIGATION AND DEVELOPMENT OF SEMICONDUCTOR-METAL CATHODES,
For primary bibliographic entry see Field 9A.
AD-653 190 HC$3.00 MF$0.65

OPTICAL AND ELECTRICAL PROPERTIES OF DIAMOND (OPTICAL AND ELECTRICAL PROPERTIES OF NON METALS).
Final scientific rept., 1 Nov 63-31 Oct 66,
Israel Atomic Energy Commission Yavne Soreq Nuclear Research Centre
A. Halperin, V. Bar, R. Chen, and J. Levinson.
Feb 67, 163p
AFCRL-67-0322
Contract AF 61 (052)-759

Descriptors: (*Diamonds, Electrical properties), (*Optical properties, Diamonds), (*Semiconductors, Diamonds), Electroluminescence, Solar cells, Phosphorescence, Thermoluminescence, Band theory of solids, Solid state physics.

Results of an investigation of some of the optical and electrical properties of diamond are described. The work included both semiconducting and insulating diamonds. After the Introduction in Chapter 1, the background for thermoluminescence (TL) work, including the development of some theoretical aspects of the correlation between TL and thermally stimulated currents (TSC) is presented in Chapter 2. The next chapter (Chapter 3) deals with the TL of semiconducting diamonds, including the observation of blue and red emitting glow peaks, and their characteristics. Chapter 4 deals with the decay of the phosphorescence at 77K in UV excited semiconducting and insulating diamonds. Chapter 5 deals with the photovoltaic effect in semiconducting and insulating diamonds and its dependence on wavelength. Chapter 6 deals with the electroluminescence (EL) of semiconducting diamonds. Lastly, Chapter 7 discusses electrically excited thermoluminescence in semiconducting diamonds.
AD-653 201 HC$3.00 MF$0.65

WAVE PROPAGATION IN SEMICONDUCTORS WITH DRIFTING CARRIERS,
Norges Tekniske Hoegskole Trondheim Div of Physical Electronics
Reidar Kuvas. Mar 67, 76p Rept no. Scientific-2, AE-3
RADC-TR-67-336
Contract AF 61 (052)-907

Descriptors: (*Semiconductors, *Propagation), Electromagnetic waves, Stability, Energy, Power, Density, Boundary layer, Vacuum, Equations, Theory, Electric fields.

A macroscopic theory for propagation of plane RF waves in semiconductors is presented. The first part deals with an extrinsic semiconductor where the elementary modes and their dispersion relations are derived from the wave equation. General boundary conditions for a semi-infinite semiconductor bounding to vacuum are considered, and six possible modes of wave propagation are found. A general expression for the power density of a plane wave is derived and used to establish a criterion for active behaviour of the medium. Instability phenomena and their relation to possible amplifying and oscillating behaviour of the medi-

um are considered. In the last part the analysis is extended to semiconductors having two types of carriers. The dispersion relations are derived. In particular, propagation of carrier waves in an electron-hole plasma and a two-valley semiconductor is considered. (Author)
AD-653 202 HC$3.00 MF$0.65

OPTICAL SPECTROSCOPY OF SEMICONDUCTOR MATERIALS.
Final rept., 1 Jan 64-31 Dec 66,
Ecole Normale Superieure Paris (France) Laboratoire de Physique
M. Balkanski. 1967, 12p
AFCRL-67-0283
Contract AF 61 (052)-789

Descriptors: (*Semiconductors, Spectroscopy), (*Silicon, Optical properties), (*Infrared spectroscopy, Semiconductors), Crystal lattices, Absorption spectrum, Radiation damage, Crystal lattice defects, Phonons, Impurities, Boron, Lithium, Isotopes, Line spectrum, Magneto-optic effect, Carriers (Semiconductors), France.

A summary is given of accomplishments in the following areas: single phonon absorption bands in fast neutron irradiated silicon; infrared absorption in boron-doped lithium-compensated silicon; optical properties of degenerate silicon. Many aspects of this work are described in greater detail in AD-619 581, AD-621 076, AD-627 066, and AD-632 145.
AD-653 204 HC$3.00 MF$0.65

RESEARCH AND INVESTIGATION OF OPTICAL PROPERTIES OF SEMI-CONDUCTING CRYSTALS.
Final rept., 16 Dec 63-15 Dec 66,
Dayton Univ Ohio Research Inst
James Schneider. Mar 67, 39p
ARL-67-0042
Contract AF 33 (615)-1257
Availability: Published in Various journals.

Descriptors: (*Semiconductors, *Single crystals), (*Birefringence, *Refractive index), Optical properties, Liquefied gases, Absorption, Reflection, Zinc compounds, Oxides, Helium, Polarization.

Measurements of the refractive indices of Zn0 single crystals are ext

Measurements of the refractive indices of Zn0 single crystals are extended from room down to liquid-helium temperatures in the region between the absorption edge and 5500A for E perpendicular C and E parallel C. The indices are calculated from the locations of interference maxima in transmission spectra caused by multiple reflections in thin (10 - 80 microns), plane-parallel platelets. The dispersion curves at room temperature are similar to those reporfed by Mollwo, (Z. Angew. Phys. 6, 257 (1954)) but they are extended to include the optical isotropic point. At energies near absorption edge n parallel < n perpendicular, while in the long wavelength region n parallel > n perpendicular, as is found in other II-VI materials of the wurtizite symmetry. The isotropic point and its variation with temperature was also determined by birefringence measurements. Between 77 and 4.2 degrees K the shift of the isotropic point is very small. (Author)
AD-653 205 Not available from CFSTI.

SPECTROMETER SYSTEM FOR STUDYING ABSORPTION FROM EXCITED METASTABLE STATES OF IONS IN CRYSTALS,
Naples Univ (Italy) Istituto Di Meccanica Delle Macchine
For primary bibliographic entry see Field 20F.
AD-653 244 Not available from CFSTI.

UNIFORMLY PROPAGATING SOLUTIONS OF TRANSPORT AND POISSON EQUATIONS FOR PERIODIC FIELD DOMAINS,
Delaware Univ Newark Dept of Physics
K. W. Boer, and G. A. Dussel. 22 Aug 66, 12p
AROD-4461:17
Contract DA-31-124-ARO (D)-173
Availability: Published in The Physical Review, v154 n2 p292-301, 10 Feb 1967.

Descriptors: (*Semiconductors, Transport properties), (*Carriers (Semiconductors), Propagation), Differential equations, Numerical analysis, Crystal lattices, Diffusion, Electromagnetic fields, Cadmium sulfides, Gallium arsenides.
Identifiers: Domains (Crystallography), Gunn effect.

Time-dependent solutions of the Poisson and transport equations containing drift and diffusion for the case of field domains propagating undeformed and with constant velocity through a crystal are discussed in terms of an analysis of their projections in the n-E plane, where n is the carrier concentration and E the magnitude of the electric field. Two principal models are discussed: one for a trap-controlled crystal (CdS type), and the other for a trap-free crystal (GaAs type, Gunn effect) for field-dependent recombination or field-dependent mobility. It is found that, in addition to the 'triangular' domains, periodic propagating solutions can exist. Conditions on the values of the domain velocity and the current are derived. (Author)
AD-653 248 Not available from CFSTI.

GROWTH OF COMPLEX SINGLE-CRYSTAL HEXAGONAL FERRITES,
Army Electronics Command Fort Monmouth N J Inst for Exploratory Research
For primary bibliographic entry see Field 20B.
AD-653 332 Not available from CFSTI.

CUBIC CRYSTAL-FIELD ENERGY LEVELS, Tb (3+):CaF2 (I),
Army Electronics Command Fort Monmouth N J Inst for Exploratory Research
Norman Rabbiner. 3 Dec 65, 15p
Availability: Published in Journal of the Optical Society of America v57 n2 p217-31 Feb 1967.

Descriptors: (*Terbium, *Atomic energy levels), (*Calcium fluorides, Impurities), (*Crystal lattice defects, Terbium), Fluorescence, Crystal lattices, Line spectrum, Perturbation theory, Approximation (Mathematics), Lasers, Materials.

Empirically derived cubic-field energy-level schemes of fluorescence of Tb (3+) in CaF2 (I) are analyzed and compared with those theoretically derived. The x values for the 5D4, 7F3, 7F4, and 7F5 states are derived to the first order for a weak cubic field, and the energies are calculated to the second order. The second-order energies when added to the theoretical first-order levels of Lea, Leask, and Wolf at the calculated x values give energy levels in agreement with the empirical schemes to within 10%, substantiating the cubic crystal-field assignment for crystal. The ratio of fourth- to sixth-order cubic crystal-field parameters (A4 (r exp.4)/A6 (r exp.6)) is found to be -11.5. (Author)
AD-653 333 Not available from CFSTI.

THE GROWTH OF GAMMA-MnS CRYSTALS IN SODIUM SILICATE GELS,
Army Electronics Command Fort Monmouth N J Inst for Exploratory Research
For primary bibliographic entry see Field 20B.
AD-653 336 Not available from CFSTI.

A TWO-PORT MAGNETOELASTIC DELAY LINE IN THE UHF REGION.
Revised ed.,
Army Electronics Labs Fort Monmouth N J
William Skudera, Jr., Robert H. Sproat, Isadore Bady, and Emanuel Gikow. 9 Sep 66, 6p
Presented at the G-MTT Symposium, Clearwater, Fla., 1965. Revision of manuscript submitted 31 Aug 65.
Availability: Published in IEEE Transactions on Microwave Theory and Techniques vMTT15 n2 p96-100 Feb 1967.

Descriptors: (*Magnets, *Ultrahigh frequency), (*Delay lines, *Single crystals), Yttrium, Garnet, Propagation, Signals, Feasibility studies, Velocity, Spin, Microwaves.

Results are presented on the investigation of an experimental two-port magnetoelastic delay line using a single crystal rod of yttrium-iron-garnet, over the frequency range of 200 to 1000 MHz. A magnetic bias field is applied parallel to the rod axis. Data is given on delay time and insertion loss as a function of bias field. Both a slow and fast variation of insertion loss with bias field are noted. The slow variation of insertion loss is quite flat and insertion loss is at a minimum, over the range of 900 to 1050 oersteds, for all frequencies from 200 to 1000 MHz. A study of the fast variation of insertion loss shows that this variation occurs only over a portion of the pulse and if the pulse is short enough the fast variation is absent. A study of the effects of small permanent magnets that supply a biasing field orothogonal to the primary biasing field is presented. Insertion loss and pulse distortion are substantially reduced by these magnets.
AD-653 342 Not available from CFSTI.

RAMAN SCATTERING FROM DONOR AND ACCEPTOR IMPURITIES IN SILICON,
Massachusetts Inst of Tech Lexington Lincoln Lab
G. B. Wright, and A. Mooradian. 13 Mar 67, 4p
Rept no. JA-2988
ESD-TR-67-310
Contract AF 19 (628)-5167
Availability: Published in Physical Review Letters v18 n15 p608-10 Apr 10 1967.

Descriptors: (*Semiconductors, *Raman spectroscopy), (*Silicon, Impurities), (*Phosphorus, Raman spectroscopy), (*Boron, Raman spectroscopy), Band theory of solids, Scattering, Intensity, Phonons, Interactions, Coherent radiation.
Identifiers: Raman scattering.

Observation was made of electronic Raman scattering from phosphorus donors and boron acceptor impurities in silicon. It was found that the most important intermediate states involve interband transitions, and that this has important consequences for the intensity of the scattering. Also reported is an observation of phonon-Raman scattering involving creation of one zone-center optical phonon with subsequent decay through the anharmonic interaction into two acoustic phonons. (Author)
AD-653 363 Not available from CFSTI.

HIGH POWER AND EFFICIENCY IN CdS ELECTRON BEAM PUMPED LASERS,
Massachusetts Inst of Tech Lexington Lincoln Lab
For primary bibliographic entry see Field 20E.
AD-653 364 Not available from CFSTI.

InSb MOS INFRARED DETECTOR,
Massachusetts Inst of Tech Lexington Lincoln Lab
For primary bibliographic entry see Field 17E.
AD-653 365 Not available from CFSTI.

DIODE LASERS OF Pb (1-y)Sn (y)Se AND Pb (1-x)Sn (x)Te,
Massachusetts Inst of Tech Lexington Lincoln Lab
For primary bibliographic entry see Field 20E.
AD-653 367 Not available from CFSTI.

UNUSUAL CRYSTAL-FIELD ENERGY LEVELS AND EFFICIENT LASER PROPERTIES OF YVO4:Nd.
Massachusetts Inst of Tech Lexington Lincoln Lab
For primary bibliographic entry see Field 20E.
AD-653 372 Not available from CFSTI.

EVALUATION OF SOME TRANSPORT INTEGRALS. II.
Battelle Memorial Inst Columbus Ohio Columbus Labs
For primary bibliographic entry see Field 20J.
AD-653 375 Not available from CFSTI.

SOME EXPERIMENTAL ASPECTS OF DIFFUSION IN METALS,
Arizona Univ Tucson Dept of Physics
C. T. Tomizuka. 1967, 24p
AFOSR-67-1235
Grant AF-AFOSR-105-63
Availability: Published in Experimental Methods of Materials Research p279-99 1967.

Descriptors: (*Metals, *Diffusion), Metallic crystals, Atoms, Mass transfer, High-pressure research, Crystal structure.

Diffusion is present whenever there is a change in the local composition in solids. When solid A and solid B are brought into contact and this couple is brought to a high temperature, it is found that after a certain length of time, the atoms of solid A near the interface have gradually moved into solid B. Transport of atoms is called diffusion. (Author)
AD-653 386 Not available from CFSTI.

VIRIAL THEOREM FOR THE HOMOGENEOUS ELECTRON GAS,
Massachusetts Inst of Tech Lexington Lincoln Lab
Petros N. Argyres. 3 Aug 66, 5p Rept no. JA-2875
ESD-TR-67-254
Contract AF 19 (628)-5167
Availability: Published in The Physical Review v154 n2 p410-3 Feb 10 1967.

Descriptors: (*Plasma medium, Equations of state), Ground state, Theorems, Electrons, Gases, Wave functions, Energy.
Identifiers: Virial theorem, Electron gas.

A proof is presented of the virial theorem for the interacting electron gas in a uniform positive background with the boundary conditions used in actual calculations of the total energy. (Author)
AD-653 396 Not available from CFSTI.

SOLID STATE RESEARCH OF THE APPLIED PHYSICS DEPARTMENT FOR THE YEAR 1965,
Naval Ordnance Lab., White Oak, Md.
W. W. Scanlon. 29 Jun 66, 58p NASA-CR-80478, NOLTR-66-139
Sponsored In Part By Nasa

Descriptors: *Crystal structure, *Intermetallics, *Magnetism, *Semiconductor, *Vaporization, Alloy, Crystal, Energy, Epitaxy, Gap, Infrared, Laser, Material, Metal, Metallurgy, Optics, Physics, Solid, State, Structure, Vacuum.

For abstract, see STAR 05 03.
N67-13103 HC$3.00 MF$0.65

PROTON BOMBARDMENT OF HIGH-PURITY SINGLE-CRYSTAL SILICON.
National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
R. F. Franks, T. E. Gilmer, Jr., and J. R. Robertson. May 67, 26p NASA-TN-D-3989
Contract 124-09-01-04-23

Descriptors: *Bombardment, *Proton damage, *Purity, *Silicon, *Single crystal, Absorption, Aluminum, Band, Crystal, Damage, Defect, Energy, Infrared, Interaction, Level, Proton, Radiation, Single, Spectrum.

For abstract, see STAR 05 14.
N67-26549 HC$3.00 MF$0.65

RESEARCH INVESTIGATION DIRECTED TOWARD EXTENDING THE USEFUL RANGE OF THE ELECTROMAGNETIC SPECTRUM PROGRESS REPORT, 1 MAY - 31 OCT. 1966.
Columbia Univ., New York. Columbia Radiation Lab.
For primary bibliographic entry see Field 7D.
For abstract, see STAR 05 14.
N67-26616 HC$3.00 MF$0.65

PHYSICAL IDEAS OF THE METHOD OF ELEMENTARY EXCITATIONS (THE MANY-ELECTRON PROBLEM IN THE THEORY OF THE SOLID STATE).
Fizicheskiye Idei Metoda Elementarnykh Vozbuzhdeniy
Holman (John F.) and Co., Inc., Washington, D.C.
V. L. Bonch-bruyevich. Apr 67, 22p NASA-TT-F-10870
Contract NASW-1495
Transl. Into English From Usp. Fiz. Nauk (Moscow), V. 56, No. 1, 1955 P 55-76

Descriptors: *Many-particle theory, *Metal, *Solid state physics, Bibliography, Concentration, Crystal, Electron, Equation, Excitation, Interaction, Lattice, Oscillation, Particle, Physics, Solid, Spin, State, Theory, Wave.

For abstract, see STAR 05 14.
N67-26622 HC$3.00 MF$0.65

STUDY OF PHENOMENA CONNECTED WITH RADIATION DAMAGE IN IRON - INTERACTION BETWEEN DEFECTS INTRODUCED AND ATOMS IN INTERSTITIAL SOLUTION.
Studio Dei Fenomeni Connessi Con Il Danno Da Radiazione Nel Ferro - Interazione Fra Difetti Introdotti Ed Atomi in Soluzione Interstiziale
Societa Ricerche Impianti Nucleari, Saluggia (Italy). Centro Ricerche Nucleari.
M. Castagna, G. S. Miszenti, and F. S. Rossi. 1967, 13p SORIN-108
in Italian Presented At Convegno Sulla Chimicafisica Dello Stato Solido E Delle Superfici, Rome, 27 Feb. - 1 Mar. 1967

Descriptors: *Interstitial atom, *Iron, *Irradiation, Atom, Carbon, Chemistry, Conference, Interaction, Interstitial, Nitrogen, Physics, Radiation effect.

For abstract, see STAR 05 14.
N67-27250 HC$3.00 MF$0.65

ELECTRO-OPTIC AND MAGNETO-OPTIC MODULATORS.
National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
For primary bibliographic entry see Field 9A.
For abstract, see STAR 05 14.
N67-27273 HC$3.00 MF$0.65

INFLUENCE OF CO 60 GAMMA IRRADIATION ON THE BULK AND SURFACE RECOMBINATION RATES IN SILICON.
North Carolina State Coll., Raleigh. Semiconductor Device Lab.
M. A. Littlejohn. 1 Mar 67, 230p NASA-CR-84446, SDL-6-588-1
Grant NSG-588

Descriptors: *Cobalt 60, *Gamma radiation, *N-type semiconductor, *P-type semiconductor, *Radiation effect, Bulk, Effect, Gamma, Irradiation, Property, Radiation, Rate, Recombination, Surface.

For abstract, see STAR 05 14.
N67-27425 HC$3.00 MF$0.65

INVESTIGATIONS OF ELECTRON EMISSION CHARACTERISTICS OF LOW WORK FUNCTION SURFACES FINAL REPORT, 27 SEP. 1964 - 28 SEP. 1966.
Field Emission Corp., Mcminnville, Oreg.
A. E. Bell, L. C. Crouser, B. E. Evans, and L. W. Swanson. Nov 66, 234p NASA-CR-84434
Contract NASW-1082

Descriptors: *Electron emission, *Work function, Adsorption, Characteristic, Electron, Emission, Emitter, Energy, Exchange, Field, Function, Kinetics, Mobility, Production, Stability, Surface, Work.

For abstract, see STAR 05 14.
N67-27437 HC$3.00 MF$0.65

TECHNIQUE FOR DRIFTING LITHIUM INTO GERMANIUM,
California Univ., Berkeley. Lawrence Radiation Lab.
For primary bibliographic entry see Field 18D.
For abstract, see NSA 21 12.
UCRL-17317 HC$3.00 MF$0.65

20M. THERMODYNAMICS

APPROXIMATE THERMODYNAMIC FUNCTIONS FOR THE H3O+ (g), AND CH3+ (g) IONS.
Technical rept.,
GM Defense Research Labs., Santa Barbara, Calif. Aerospace Operations Dept.
David G. Clifton. Jun 64, 26p TR64-02-D
Contract DA-04-495-ORD-3567 (Z), ARPA Order-357-63
Rept. of proj. DEFENDER, Hypervelocity Range Research Program.

Descriptors: (*Thermodynamics, *Ions), Hydrocarbons, Valence, Entropy, Gas ionization, Enthalpy, Ionization, Flames, Spectroscopy, Mathematical analysis, Tables.

Approximate values for the free-energy function, enthalpy function, entropy, and constant-pressure heat capacity have been calculated for the ions H3O + (g), HCO+ (g), and CH3+ (g). A structural analysis of the ions based upon chemical valence considerations leads to the estimation and assignment of the spectroscopic constants, which are then used for the statistical thermodynamic calculations. (Author)
AD-444 078 HC$3.00

BEHAVIOR OF IONS AND QUANTIZED VORTEX RINGS OF LOW ENERGY IN HELIUM II AROUND 0.3K,
Chicago Univ Ill
For primary bibliographic entry see Field 20D.
AD-652 721 Not available from CFSTI.

HEAT TRANSFER AND EQUILIBRIUM TEMPERATURE OF A SPHERE IN A SUPERSONIC FLOW OF RAREFIED GAS.
Johns Hopkins Univ Silver Spring Md Applied Physics Lab
For primary bibliographic entry see Field 20D.
AD-652 820 HC$3.00 MF$0.65

BLACK BODY FUNCTIONS FOR PYROTECHNICISTS,
Denver Research Inst Colo
For primary bibliographic entry see Field 19A.
AD-652 822 HC$3.00 MF$0.65

PHASE-CHANGE PROBLEMS WITH VARIABLE TEMPERATURES.
Revised ed.,
California Univ San Diego La Jolla
O. P. Sharma, M. Rotenberg, and S. S. Penner.
11 Oct 66, 9p
AROD-5133:46
Contract DA-31-124-ARO (D)-257, ARPA Order-0570
Revision of manuscript submitted 12 July 66.
Availability: Published in AIAA Journal v5 n4 p677-82 Apr 1967.

Descriptors: (*Surface temperatures, Approximation (Mathematics)), (*Heat transfer, Ablation), Heat flux, Transformations (Mathematics), Numerical analysis, Thermal diffusion, Thermal conductivity, Boundary value problems, One-dimensional flow.

Simplified procedures are described for the approximate solution of heat-transfer problems with phase change for time-dependent surface temperatures. For constant surface temperature, the specified problem reduces to classical form and may be solved analytically by the method of Neumann. Comparisons between our approximate solutions and numerical solutions, for time-independent and for time-dependent surface temperatures, show that our techniques yield estimates for the rate of movement of the interface between the phases which become progressively better as the complexity of the simplified approximation is increased.
AD-652 968 Not available from CFSTI.

INERTIAL RANGES IN TWO-DIMENSIONAL TURBULENCE.
Kraichnan (Robert H) Peterborough N H
For primary bibliographic entry see Field 20D.
AD-653 111 HC$3.00 MF$0.65

A NEW THEORY OF THE SUPERFLUID VORTEX PHENOMENON,
California Univ San Diego La Jolla Dept of Physics
J. Sarfatt. 27 Feb 67, 5p
AROD-5133:98
Contract DA-31-124-ARO (D)-257, ARPA Order-0570
Availability: Published in Physics Letters v24A n7 p399-400 Mar 27 1967.

Descriptors: (*Superfluidity, Turbulence), Vortices, Helium, Phonons.

A new theory of the turbulence of superfluid helium is given. Its relation to the older theory is clarified, and its close connection with experimental measurements of the high momentum excited states is presented. (Author)
AD-653 237 Not available from CFSTI.

A MODIFICATION OF THE DIFFERENTIAL APPROXIMATION FOR RADIATIVE TRANSFER,
California Univ San Diego La Jolla
D. B. Olfe. 1 Aug 66, 9p
AROD-5133:48
Contract DA-31-124-ARO (D)-257, ARPA Order-0570
Availability: Published in AIAA Journal v5 n4 p638-43 Apr 1967.

Descriptors: (*Heat flux, Thermal radiation), (*Gas flow, Heat flux), Boundary value problems, Differential equations, Mathematical models, Thermodynamics, Thermal analysis.
Identifiers: Differential approximation.

In radiation-gas dynamics problems, frequent use has been made of the differential approximation, which involves replacing the integral equation of transfer by a differential equation for the flux. This differential approximation may be inaccurate at small optical depths if external radiation sources are present. A procedure that correctly accounts for the external radiation is developed in this paper. The resulting modified differential approximation is first applied to the one-dimensional problem of a medium in radiative equilibrium between two parallel walls held at different temperatures. The calculated flux is superior to that obtained using the unmodified differential approximation, especially in the optically thin limit where the modified differential approximation gives the correct (though small) absorption of the medium. The modified differential approximation is also used to solve the two-dimensional problem of linearized flow of a radiating gas over a wall with a sinusoidal temperature distribution. With a characteristic optical depth defined with respect to the wavelength of the wall temperature, it is found that the modified differential approximation gives accurate values for the flow variables over the entire opacity range, yielding the correct values in the cptically thin limit. On the other hand, the unmodified differential approximation yields values that become increasingly inaccurate as the characteristic optical depth becomes small. (Author)
AD-653 242 Not available from CFSTI.

TEMPERATURE TRANSFORMATIONS, A 'PRACTICAL' CHOICE,
Rochester Univ N Y Dept of Physics and Astronomy
J. H. Eberly. 30 Jan 67, 8p
AROD-4965:27
Grant DA-ARO (D)-31-124-G569
Availability: Published in Il Nuovo Cimento v48 Ser10 p167-70 Mar 11 1967.

Descriptors: (*Temperature, Thermodynamics), (*Relativity theory, Temperature), Transformations, Statistical mechanics.

Different viewpoints regarding the transformation of temperature are discussed and compared. The author finds that there is a very practical argument in favor of the older temperature law of Mosengeil, Planck and Einstein. He concludes that even though thermodynamics can coexist peacefully with any of several relativistic transformation laws for temperature, none of which can be labelled right or wrong, the utility of the simplicity in the older law makes it preferable. (Author)
AD-653 252 Not available from CFSTI.

THE UNIQUENESS OF SOLUTIONS OF THE HEAT EQUATION IN AN INFINITE STRIP.
California Univ Riverside
For primary bibliographic entry see Field 12A.
AD-653 255 Not available from CFSTI.

RELATIVISTIC STATISTICAL MECHANICS AND BLACKBODY RADIATION,
Rochester Univ N Y Dept of Physics and Astronomy
For primary bibliographic entry see Field 7D.
AD-653 256 Not available from CFSTI.

KINETIC MODELS FOR A GAS WITH INTERNAL STRUCTURE,
Brown Univ Providence R I Div of Engineering
For primary bibliographic entry see Field 20D.
AD-653 296 Not available from CFSTI.

THERMODYNAMIC ANALYSIS OF VAPOR-LIQUID AND VAPOR-SOLID EQUILIBRIA DATA TO OBTAIN INTERACTION SECOND VIRIAL COEFFICIENTS,
Oklahoma Univ Norman
C.-h. Chiu, and F. B. Canfield. 1967, 14p
AFOSR-67-1245
Grant AF-AFOSR-1020-66
Availability: Published in Advances in Cryogenic Engineering v12 p741-53 1967.

Descriptors: (*Phase studies, Equations of state), (*Methane, Thermodynamics), (*Hydrogen, Thermodynamics), Mixtures, Pressure, Volume, Potential energy, Graphics, Interactions.
Identifiers: Virial coefficients.

A graphical method is developed for calculating second interaction virial coefficients from vapor-liquid and vapor-solid equilibria data. The method is restricted to the case where the condensed phase is essentially pure. The method is applied to existing vapor-liquid and vapor-solid equilibria data for the hydrogen-methane system. The effect on the second interaction virial coefficient from errors in the observed data is elucidated. Force constants for the interaction between hydrogen and methane are calculated for the quantum Lennard-Jones (12:6) potential and compared with various mixing rules. (Author)
AD-653 369 Not available from CFSTI.

MELTING POINTS AT HIGH COMPRESSIONS FROM ZERO-COMPRESSION PROPERTIES THROUGH THE KENNEDY RELATION,
California Univ Los Angeles Dept of Chemistry
W. F. Libby. 6 Jul 66, 5p
AFOSR-67-1239
Grant AF-AFOSR-245-65
Availability: Published in Physical Review Letters v17 n8 p423-4 Aug 22 1966.

Descriptors: (*High-pressure research, *Melting point), (*Phase studies, Melting point), Compressive properties, Liquids, Density, Heat of fusion, Entropy, Volume, Geophysics.
Identifiers: Core (Earth).

The Kennedy Relation - the melting point of a solid changes linearly with change in density for a given phase - is a most important discovery, both for understanding of the nature of the liquid state and for application to the melting points of possible constituents of the earth's interior. The paper shows how the slope of the melting point versus density line can be calculated from low pressure data, it being given by (K (Delta-S))/Delta-V where K is the bulk modulus, Delta-S is the molal entropy of fusion, and Delta-V is the molal volume change on melting - all at zero pressure. (Author)
AD-653 382 Not available from CFSTI.

THERMAL-ACOUSTIC OSCILLATIONS INDUCED BY FORCED CONVECTION HEATING OF DENSE HYDROGEN,
Los Alamos Scientific Lab., N. Mex.
Rodney S. Thurston. Apr 66, 159p
Contract W-7405-eng-36

Descriptors: (*Convection (Heat transfer), Oscillation), (*Hydrogen, Density).

For abstract, see NSA 20 23.
LA-3543 HC$3.00 MF$0.65

EXPERIMENTAL HEAT-TRANSFER INVESTIGATION OF NONWETTING, CONDENSING MERCURY FLOW IN HORIZONTAL, SODIUM POTASSIUM COOLED TUBES.
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
W. D. Kenney, R. A. Lottig, and R. W. Vernon.
May 67, 28p NASA -TN-D-3998
Contract 701-04-00-02-22

Descriptors: *Heat transfer, *Mercury (metal), *Potassium, *Sodium cooling, *Static pressure, *Tube heat exchanger, Coefficient, Condensation.

Cooling, Exchanger, Flow, Heat, Instrumentation, Nonwetting, Pressure, Rate, Sodium, Static, Tube.

For abstract, see STAR 05 14.
N67-26552 HC$3.00 MF$0.65

PROTECTIVE COOLING BY A MULTISLOT AND NETWORK-TYPE INJECTION INTO A TURBULENT BOUNDARY LAYER.
Zagraditel'noye Okhlazndeniye Pri Mnogoshchelevom I Reshetchatom Vduve V Turbulentnyy Pogranichnyy Sloy
International Information, Inc., Philadelphia, Pa.
S. S. Kutateladze, A. I. Leontev, V. IA.Levchenko, and E. P. Volchkov. Dec 66, 10p NASA-TT-F-10643
Contract NASW-1499
Transl. Into English Frcm Zh. Prik. Mekhan. I Techn. Fiz. (Moscow), No. 3, 1966 P 149-153

Descriptors: *Gas injection, *Surface cooling, *Thermal protection, *Turbulent boundary layer, Boundary, Cooling, Effectiveness, Flow, Gas, Injection, Insulation, Layer, Plane, Protection, Slot, Surface, Thermal, Turbulent, Wall.

For abstract, see STAR 05 14.
N67-26572 HC$3.00 MF$0.65

EXPERIMENTAL DETERMINATION OF TRANSPORT PROPERTIES OF HIGH TEMPERATURE GASES.
Panoramic Research, Inc., Palo Alto, Calif.
C. Carey, E. H. Carnevale, G. Larson, L. C. Lynnworth, and T. Marshall. Jun 67, 113p NASA-CR-789
Contract NASW-1161

Descriptors: *Gas transport, *High temperature gas, *Transport property, *Ultrasonic testing, Absorption, Argon, Carbon dioxide, Collision, Gas, Helium, High temperature, Measurement, Method, Nitrogen, Oxygen, Property, Relaxation, Rotation, Sound, Testing, Transport, Ultrasonic, Velocity, Vibration.

For abstract, see STAR 05 14.
N67-27223 HC$3.00 MF$0.65

HEAT-TRANSFER AND TEMPERATURE DISTRIBUTION OF A CONICAL POROUS MEMBRANE DURING PLANETARY ENTRY.
National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
L. M. Jiji. Jun 67, 32p NASA-TN-D-4019
Contract 124-07-02-27-00-21

Descriptors: *Decelerator, *Heat transfer, *Planetary entry, *Porous wall, *Temperature distribution, Angle, Ballistics, Conical, Distribution, Entry, Gas, Ideal, Membrane, Parameter, Planetary, Point, Porosity, Stagnation, Surface, Temperature, Trajectory, Wall.

For abstract, see STAR 05 14.
N67-27612 HC$3.00 MF$0.65

TIME-TEMPERATURE CHARACTERISTICS OF THIN- SKINNED MODELS AS AFFECTED BY THERMOCOUPLE VARIABLES SEMIANNUAL REPORT.
North Dakota Univ., Grand Forks.
M. B. Larson. 15 May 67, 18p NASA-CR-84500, SAR-4
Contract NGR-35-002-003

Descriptors: *Thermal property, *Thermocouple, *Time factor, *Wind tunnel model, Analysis, Factor, Model, Numerical, Problem, Property, Sheet, Shock, Single, Skin, Solution, Thermal, Thin, Time, Tunnel, Wind, Wire.

For abstract, see STAR 05 14.
N67-27667 HC$3.00 MF$0.65

A MATHEMATICAL INVESTIGATION OF A HEAT TRANSFER CONFIGURATION.
North Dakota Univ., Grand Torks.
P. G. Nelson. Jun 67, 40p NASA-CR-84503
Contract NGR-35-002-003

Descriptors: *Differential equation, *Heat transfer, *Laplace transform, Differential, Distribution, Equation, Hermitian polynomial, Nondimensional, Problem, Resistance, Skin, Solution, Temperature, Thin, Wire.

For abstract, see STAR 05 14.
N67-27668 HC$3.00 MF$0.65

GAS EQUATION OF STATE FOR NATURAL MATERIALS,
California Univ., Livermore. Lawrence Radiation Lab.
For primary bibliographic entry see Field 18C.
For abstract, see NSA 21 12.
UCRL-14729 HC$3.00 MF$0.65

20N. WAVE PROPAGATION

ELECTROMAGNETIC MOMENTUM ASSOCIATED WITH WAVEGUIDE MODES,
Massachusetts Inst of Tech Cambridge Research Lab of Electronics
For primary bibliographic entry see Field 9A.
AD-652 907 Not available from CFSTI.

CONVECTIVE INSTABILITIES DRIVEN BY ELECTROMAGNETIC WAVES,
Texas Univ Austin Dept of Physics
For primary bibliographic entry see Field 20I.
AD-653 253 Not available from CFSTI.

CRITERION FOR APPLICATION OF THE DIFFERENTIAL DOPPLER METHOD,
American Museum of Natural History New York Dept of Animal Behavior
P. R. Arendt. 1966, 4p
Availability: Published in Nature v212 n5068 p1343-3 Dec 17 1966.

Descriptors: (*Radio waves, *Satellites (Artificial)), (*Ionosphere, *Doppler effect), Electrons, Propagation, Computer programs, Corrections, Errors, Frequency shift.

Differential Doppler measurements on radio waves emitted from artificial satellites have been successfully used to obtain data of the ionospheric electron content. Uncertainties inherent in the indiscriminate use of this method have not been discussed so far. Attempts to obtain Doppler data of high precision indicate that the consequences of the basic assumptions must be considered. It is therefore necessary to interpret differential Doppler data with care.
AD-653 348 Not available from CFSTI.

BEAM WAVEGUIDE EXCITATION BY THE APERTURE FIELD OF A TUBULAR WAVEGUIDE,
American Museum of Natural History New York Dept of Animal Behavior
For primary bibliographic entry see Field 9A.
AD-653 349 Not available from CFSTI.

INTERFACE WAVES WITH A FLEXIBLE BOND.
Rept. for Nov. 65-Jul 66,
Aerospace Corp., El Segundo, Calif. Labs. Div.
J. P. Jones, and J. S. Whittier. Oct 66, 29p TR-1001 (2240-30)-2
SSD-TR-66-198
Contract AF 04 (695)-1001

Descriptors: (*Mechanical waves, *Elasticity), Propagation, Bonding Theory, Mechanical properties, Surface properties, Mathematical analysis.

Plane strain elastic wave propagation is studied for two dissimilar halfspaces joined together at a plane interface by a thin elastic bond. Attention is focussed on solutions corresponding to the propagation of interface waves along the bond. The existence of interface waves is found to be governed by a parameter involving bond stiffness and wave length. The limiting case of an infinitely stiff bond corresponds to the interface wave problem first solved by Stoneley and it is shown that the present analysis yields Stoneley's frequency equation in this limit. Also the limiting case of an infinitely soft bond is found as expected to give two Rayleigh surface waves, one in each medium. It is shown analytically that for intermediate bond stiffnesses there may occur zero, one, or two interface waves depending on the properties of the bond and the media. Illustrative numerical examples are presented. It is the conclusion of this study that account must be taken of the stiffness of the bond and the wavelength of the disturbance before it is proper to speak of an interface wave existing or not existing at a bonded interface. (Author)
AD-803 393 HC$3.00 MF$0.65

GENERAL THEORY OF ASYMMETRIC WAVES IN A CIRCULAR WAVEGUIDE WITH AN OPEN END.
Obshchaya Teoriya Nesimmetrichnykh Voln V Kruglom Volnovode S Otkrytym Kontsom
National Aeronautics and Space Administration, Washington, D. C.
L. A. Vaynshteyn. May 67, 24p NASA-TT-F-473
Transl. Into English From Zh. Teckhn. Fiz. (Leningrad), V. 21, No. 3, 1951 P 328-345

Descriptors: *Electromagnetic wave, *Wave propagation, Asymmetry, Circular, Coefficient, Current, Density, Diffraction, Electromagnetic, Field, Huygen principle, Propagation, Radiation, Reflection, Transformation, Tube, Wave, Waveguide.

For abstract, see STAR 05 14.
N67-26621 HC$3.00 MF$0.65

EXTERNAL NOISE AND ANTENNA NOISE TEMPERATURES IN THE 136 AND 400- M HZ SATELLITE FREQUENCY HANDS.
Deutsche Versuchsanstalt Fur Luft- Und Raumfahrt, Oberpfaffenhofen (West Germany). Institut Fuer Flugfunk Und Mikrowellen.
For primary bibliographic entry see Field 17B.
For abstract, see STAR 05 14.
N67-27260 HC$3.00 MF$0.65

TABLES AND GRAPHS OF EIGENVALUES FOR LAYERED-GROUND PROPAGATION .
Technical rept.,
Institute for Telecommunication Sciences and Aeronomy, Boulder, Colo.
L. E. Vogler, and J. L. Noble. Nov 66, 54p ITSA-5
IER-5

Descriptors: (*Radio transmission, Spheres), Radio fields, Tables, Graphics, Propagation, Numerical analysis, Differential equations, Functions.

This paper presents tables and graphs of the roots tau sub s of the height gain differential equation arising from the problem of radio diffraction over a sphere: h sub 2 (-2 to the 1/3 power tau sub s)/ h'sub 2 (-2 to the 1/3 power tau sub s) = 2 to the 1/3 power K exp (-i (135 degrees - b/2)), where h sub 2 (z) is the modified Hankel function. The first three roots are calculated for b ranging from +90 degrees to -90 degrees at 10 degrees intervals and for K ranging from 0 to infinity; the first nine

roots are given for b = +90 degrees, 0 degrees and -90 degrees. A discussion is included which explains the use of tau sub s in the calculation of diffracted fields over either layered or non-layered grounds. (Author)
PB-173 811 HC$3.00 MF$0.65

THE SIZE OF IONOSPHERIC FRESNEL ZONES IN LONG WAVE PROPAGATION.
Technical rept.,
Institutes for Environmental Research, Boulder, Colo.
J. H. Crary, and D. D. Crombie. Feb 67, 19p
ITSA-13
IER-13
Supported in part by ARPA Order-183.

Descriptors: (*Ionospheric propagation, Radio transmission), Low frequency, Very low frequency, Atmospherics.

For a localized depression of the ionosphere to have an effect on the propagation of radio waves comparable to that of a uniform depression of the same depth covering the whole path, it must have horizontal dimensions comparable with the size of a Fresnel Zone. Curves showing the size of the Fresnel Zone in the ionosphere at frequencies of 10, 20, 100, and 300 kc/s for ionosphere heights of 30, 50, 70, and 90 km are given for distances out to the optical horizon. (Author)
PB-174 763 HC$3.00 MF$0.65

21. PROPULSION AND FUELS

21B. COMBUSTION AND IGNITION

PROPELLANTS AND COMBUSTION: COMPILATION OF ABSTRACTS.
Rept. no. 1 on ATD work assignment nos. 68 and 77,
Library of Congress Washington D C Aerospace Technology Div
Serge Markov, and Boris Ofrossimow. 28 Dec 66, 74p Rept no. ATD-66-146
TT-67-62064
Rept. on Surveys of Foreign Scientific and Technical Literature.

Descriptors: (*Rocket propellants, Reviews), (*Combustion, Reviews), (*Hydrazine, Thermodynamics), Reaction kinetics, Liquid rocket propellants, Solid rocket propellants, Additives, Fuels, Abstracts, USSR.

The document is one in a series dealing with liquid and solid propellant technologies; and with the kinetics of combustion and the effect of additives on combustion. The material is based on Communist World (mainly Soviet) open sources. Included are 43 abstracts, one book review, and one complete translation: 'Thermodynamic functions of Hydrazine and its Methyl Derivatives', by A. A. Vvedenskiy and T. N. Masalitinova, Z. Fizicheskoy Khimii v40 p1372 1966.
AD-652 845 HC$3.00 MF$0.65

THE CARBON-OXYGEN REACTION: AN EXPERIMENTAL STUDY OF THE OXIDATION OF SUSPENDED CARBON SPHERES.
Pennsylvania State Univ University Park Dept of Fuel Science
For primary bibliographic entry see Field 7D.
AD-652 933 HC$3.00 MF$0.65

SURFACE EFFECTS IN SEEDED COMBUSTION PRODUCTS.
Cornell Univ Ithaca N Y Graduate School of Aerospace Engineering
For primary bibliographic entry see Field 20I.
AD-653 216 HC$3.00 MF$0.65

A FURTHER STUDY OF DIFFUSION FLAME STABILITY.
Revised ed.,
Illinois Univ Urbana Dep t of Chemistry and Chemical Engineering
R. A. Schmitz. Sep 66, 17p
AROD-5648:2
Grant DA-ARO (D)-31-124-G727
Revision of manuscript submitted Jun 66.
Availability: Published in Combustion and Flame v11 n1 p49-62 Feb 1967.

Descriptors: (*Flames, Stability), Flame propagation, Diffusion, Mathematical analysis, Fluid dynamic properties, Reaction kinetics, Differential equations.

The paper presents a mathematical analysis of the stability of a one-dimensional model of a diffusion flame to small disturbances. The study results in establishing necessary and sufficient conditions for stability of a steady state solution. It is shown that numerical solution of the steady state equations by an iterative scheme, based on the Newton root-finding method, provides necessary and sufficient information to determine stability or instability immediately upon convergence to a steady state solution. The methods employed permit a rather general mathematical description regarding fluid properties and reaction-kinetic model but apply only when the Lewis number is unity, all component diffusivities are equal and no heat losses occur. Physical interpretations of the resulting criteria for stability are discussed. (Author)
AD-653 233 Not available from CFSTI.

ASYMPTOTIC TREATMENT OF PREMIXED FLAME STRUCTURE WITH DIFFUSION.
Revised ed.,
TRW Systems Redondo Beach Calif
Francis E. Fendell. 14 Dec 66, 5p
AROD-6453:1
Contract DAHCO4-67-C-0015
Revision of manuscript submitted 29 Aug 66.
Availability: Published in AIAA Journal p808-9 Apr 1967.

Descriptors: (*Flames, Mathematical analysis), Laminar flow, Diffusion, Reaction kinetics, Thermodynamics, Transport properties.

In a previous paper (Astronaut. Acta v11 p418 1965), the decomposition of a spherical monopropellant droplet in a stagnant atmosphere was examined for a zero-activation-energy, first-order reaction by means of matched asymptotic (inner-and-outer) expansions. This note, by considering the simplest model within reason, attempts to suggest that the inner-and-outer technique may be useful in quickly characterizing some one-dimensional plane steady laminar flame problems in the limits of nearly equilibrium (Di >> 1) and nearly frozen (Di << 1) flow.
AD-653 250 Not available from CFSTI.

NITROGEN TETROXIDE DISPOSAL UNIT COMBUSTION PRODUCTS.
National Aeronautics and Space Administration. Manned Spacecraft Center, Houston, Tex.
I. D. Smith. May 67, 8p NASA-TN-D-3965
Contract 914-80-05-02-72

Descriptors: *Combustion product, *Nitrogen oxide, *Tetroxide, Analysis, Carbon, Combustion, Dioxide, Disposal, Fuel, Hydrogen, Infrared, Nitrogen, Oxide, Product, Spectroscopy, Unit, Vapor, Water.

For abstract, see STAR 05 14.
N67-26544 HC$3.00 MF$0.65

STUDY OF CHUGGING INSTABILITY WITH LIQUID- OXYGEN AND GASEOUS-HYDROGEN COMBUSTORS.
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
L. A. Diehl, M. F. Heidmann, and D. E. Sokolowski. Jun 67, 41p NASA-TN-D-4005

Descriptors: *Combustion instability, *Lox-hydrogen engine, *Mathematical model, *Scale model, *Test firing, Analysis, Boundary, Chugging, Combustion, Engine, Equation, Firing, Hydrogen, Injection, Instability, Jet, Lag, Lox, Model, Pressure, Response, Scale, System, Test, Time, Volume.

For abstract, see STAR 05 14.
N67-27227 HC$3.00 MF$0.65

AN EXPERIMENTAL CORRELATION OF THE NONREACTIVE PROPERTIES OF INJECTION SCHEMES AND COMBUSTION EFFECTS IN A LIQUID-PROPELLANT ROCKET ENGINE. PART II. INSTRUMENTATION, EXPERIMENTAL APPARATUS, AND EXPERIMENTAL TECHNIQUES.
Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
For primary bibliographic entry see Field 21H.
For abstract, see STAR 05 14.
N67-27232 HC$3.00 MF$0.65

M-1 INJECTOR DEVELOPMENT - PHILOSOPHY AND IMPLEMENTATION.
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
For primary bibliographic entry see Field 21H.
For abstract, see STAR 05 14.
N67-27238 HC$3.00 MF$0.65

SOURCES OF POLYNUCLEAR HYDROCARBONS IN THE ATMOSPHERE.
National Center for Air Pollution Control, Cincinnati, Ohio.
For primary bibliographic entry see Field 13B.
PB-174 706 HC$3.00 MF$0.65

21C. ELECTRIC PROPULSION

INVESTIGATION OF CHARGED COLLOID BEAMS FOR ELECTROSTATIC PROPULSION FINAL REPORT.
Cosmic, Inc., Washington, D. C.
H. Anton, and D. Gignoux. May 67, 54p NASA-CR-54702, REPT.-165
Contract NAS3-7924

Descriptors: *Colloidal propellant, *Glycerol, *Test facility, Beam, Charge, Colloid, Current, Efficiency, Facility, Flow, Instrumentation, Mass, Propellant, Test, Thrustor.

For abstract, see STAR 05 14.
N67-26640 HC$3.00 MF$0.65

MAGNETOSOLIDMECHANIC GENERATOR.
Thessaloniki Univ. (Greece).
r primary bibliographic entry see Field 10A.
For abstract, see STAR 05 14.
N67-27779 HC$3.00 MF$0.65

SOME PROBLEMS RELATED TO ELECTRIC PROPULSION,
Massachusetts Inst. of Tech., Cambridge. Dept. of Electrical Engineering.
David C. White, Richard D. Thornton, Charles Kingsley, Jr., David Navon, and Sakutaro Nonaka. 1 Nov 66, 133p
Contract C-85-65

Descriptors: (*Electric propulsion, *Linear systems), Electric motors, Design, Integral trans-

forms, Digital computers, Fourier analysis, Velocity, Performance (Engineering), Voltage, Degradation, Power, High frequency, Efficiency, Costs, Transformers, Vehicles, Transmission lines, Model tests.

Content: Short-stator effects in linear-induction motor; Discussion of the Laithwaite goodness factor; Summary of double-sided linear induction motor design; Summary of the effect on induction motor performance non-sinusoidal excitation; Laithwaite semiconductor-switched motors; A linear induction power-transfer system for vehicles; Design of a double-sided linear induction motor for electric propulsion; Induction motor supplied by simple frequency inverter, producing rectangular voltage waveform.
PB-173 639 HC$3.00 MF$0.65

21D. FUELS

IDENTIFICATION AND CHARACTERIZATION OF PETROLEUM FUELS USING TEMPERATURE-PROGRAMMED GAS-LIQUID CHROMATOGRAPHY.
Final rept.,
Army Coating and Chemical Lab., Aberdeen Proving Ground, Md.
Maurice E. Le Pera. Nov 66, 45p CCL-218

Descriptors: (*Petroleum, Chromatographic analysis), (*Fuels, Chromatographic analysis), (*Gas chromatography, Fuels), Gasoline, Jet engine fuels, Fuel oil, Standards, Test methods, Automatic.

A technique was developed for the identification and preliminary characterization of petroleum fuels utilizing temperature-programmed gas-liquid chromatography. A listing of prepared chromatograms, comprising from gasoline to diesel fuels, are provided as reference standards for profile evaluations. Unknown fuels can be identified as to either gasoline, turbine, or diesel and characterization according to specific grade (or type) or composition (aromatic or paraffinic) can be determined. (Author)
AD-646 382 HC$3.00 MF$0.65

FEASIBILITY STUDY OF TURBINE FUEL GELS FOR REDUCTION OF CRASH FIRE HAZARDS.
Final rept.,
Western Co of North America Dallas Tex Research Div
Ken Posey, Jr., and Richard Schleicher. Feb 66, 62p
FAA-ADS-62
Contract FA-64-WA-5053

Descriptors: (*Solid jet engine fuels, Feasibility studies), (*Aviation fuels, *Gels), (*Fuel additives, Gels), Aviation safety, Fire safety, Turboprop engines, Amides, Flammability, Flame propagation, Freezing, Ignition, Acceptability.
Identifiers: Coco hydroxybutyramides, Gelled fuels, Thickening agents.

Several additives for gelling turbine fuel were studied and tested to predict (1) their ability to reduce or prevent fuel fire in aircraft crashes and (2) heir ability to maintain the turbine engine quality of the fuel. An additive known as N-coco-gamma-hydroxybutyramide (CHBA) was found to give a strong, solid gel when mixed in the ratio of 1.5 percent to the weight of the fuel. Laboratory scale impact tests in the presence of an open flame were made of several types of gels. The CHBA gave the best results and reduced the amount of flame generated by 85.2 percent as compared to ungelled fuel. Flame propagation rate on the surface of the gel was less by 96.7 percent. This gel is easily liquefied by heating it to 130F. Chemical and physical tests of the CHBA liquefied gel indicate that it meets turbine engine fuel requirements in all respects except freezing point, which is necessarily high because of the solid nature of the gel. Five gallons of liquefied CHBA gel were burned in a 0.75 gallon per hour standard commercial oil burner having a nozzle with a 60 degree cone orifice. Ignition was instantaneous and the material was visually observed to burn with a smooth, steady flame without leaving deposits or causing corrosion. In a separate test, the solid gel itself was pumped to the nozzle with a gear pump. It burned in the same manner as the liquefied gel. (Author)
AD-652 918 HC$3.00 MF$0.65

ANALYSIS OF PROPANE GAS,
Naval Air Material Center Philadelphia Pa Aeronautical Materials Lab
E. R. Wright, and M. Perlman. 6 Sep 66, 6p Rept no. NAEC-AML-2501

Descriptors: (*Fuels, Acceptability), (*Propanes, Chemical analysis), Impurities, Alkenes, Gas analysis, Gas chromatography.

A sample of propane gas, submitted by the Marine Corps Air Station, Cherry Point, North Carolina, was analyzed for percent total impurities and specifically for unsaturated hydrocarbons. Based on the results obtained, it is concluded the propane gas is satisfactory for use. (Author)
AD-653 066 HC$3.00 MF$0.65

RELATIONSHIP BETWEEN THE MINEX AND THE HELIUM-DRIVEN MODIFIED COKER IN THE MEASUREMENT OF JET FUEL THERMAL STABILITY,
Air Force Aero Propulsion Lab Wright-Patterson AFB Ohio
Herbert R. Lander, Jr., and Alan E. Zengel. Feb 67, 54p Rept no. AFAPL-TR-67-17

Descriptors: (*Jet engine fuels, Thermal stability), (*Aviation fuels, Test equipment), Pyrolysis, Test methods, Instrumentation, Heat exchangers, Pumps, Heaters, Deposits, Fouling.
Identifiers: Cokers, Minex heat exchangers.

Six different jet fuels were tested for their resistance to thermal deposition by two versions of the CRC modified coker and the Minex heat exchanger. The test results are compared by plotting the coker deposit code rating versus coker-preheater-tube wall temperature. The temperature of the tube wall, where large quantities of deposits form, is compared with the temperature of the Minex fuel-out, where tube fouling due to deposits occurs. Fouling is indicated by a change in measured heat transfer coefficient. The relative ranking of the six fuels was the same on the Minex as on the helium-driven modified coker. The pump-driven modified coker, however, gave a relative ranking that correlated with neither the Minex nor the gas-driven coker. It was concluded that the pump-driven modified coker was not a satisfactory test tool for fuels with a resistance to thermal degradation above 500F. It was also apparent that the pump on the coker was affecting the test results when fuels of high thermal stability were tested. The most obvious reason for this effect is that the fuels with thermal stability above 500F were treated to remove trace materials, and that these trace materials provide a degree of boundary lubrication. Without this degree of boundary lubrication, the coker pump may wear and release wear products that affect the test results. (Author)
AD-653 188 HC$3.00 MF$0.65

STUDY OF COSTS OF PRODUCTION AND POTENTIAL FUTURE MARKETS FOR (PHASE I) LOW-BTU INDUSTRIAL FUEL-GAS (PRODUCER GAS) AND (PHASE II) INDUSTRIAL HYDROGEN.
Battelle Memorial Inst., Columbus, Ohio. Columbus Labs.
For primary bibliographic entry see Field 5C.
PB-174 835 HC$3.00 MF$0.65

21E. JET AND GAS TURBINE ENGINES

TME-300 COMPUTER EVALUATION OF TELECTRO-MEK, INC. RAM DRAG AND THRUST COMPUTERS.
Technical rept.,
Naval Air Turbine Test Station, Trenton, N. J. Aeronautical Turbine Lab.
Joseph E. Femia. May 65, 95p NATTS-ATL-103

Descriptors: (*Special purpose computers, Accuracy), (*Turbojet engines, Special purpose computers), Exhaust gases, Pressure, Transducers, Thrust, Drag, Measurement, Effectiveness, Altitude chambers, Tests, Thrust meters.
Identifiers: J-79 Engines.

The net thrust (TME-300), gross thrust (TME-300C1), ram drag (TME-300-C2) computers were evaluated on a J79-GE-8 engine at a simulated flight conditions ranging from static sea level to 50,000 ft, M = 1.4. The purpose of these tests was to determine the accuracy of the computers. The TME-300-C2 indicated ram drag was within = 1.3% F.S. or = 115 lbs of the calculated and the measured ram drags. The TME-300C1 indicated gross thrust was within = 2.5% F.S. (=375 lbs) of the calculated and the measured thrusts for 81% of the data. The gross thrust computer operated erratically at altitudes below 5,000 ft. For altitudes above 5,000 ft, the computer indicated gross thrust was within =2.0% F.S. (=295 lbs). The TME-300 indicated net thrust was within =3.0% F.S. (=450 lbs) of the calculated and the measured net thrust. The TME-300C1 gross thrust computer was bench tested and found to malfunction on several occasions. Despite the malfunctions, the computer demonstrated an accuracy of indicating gross thrust to within =1.2% F.S. (=180 lbs) of the calculated gross thrust. This degree of accuracy was not attained during the engine tests. (Author)
AD-466 202 HC$3.00 MF$0.65

ADVANCEMENT OF SMALL GAS TURBINE ENGINE ACCESSORY TECHNOLOGY.
Final rept.,
Curtiss-Wright Corp Wood-Ridge N J Wright Aeronautical Div
Harry L. Richardson, and Rocco M. Tommasini. Apr 67, 239p Rept no. WAD-R-431-F
USAAVLABS-TR-67-13
Contract DA-44-177-AMC-297 (T)

Descriptors: (*Turbine parts, Design), (*Gas turbines, Design), Fluid amplifiers, Control, Packaging, Weight, Volume, Maintainability.

The basic requirements for controls and accessories for gas generators in the 2-to-5 pound per second airflow range are established. These requirements are then investigated in terms of current and projected state-of-the-art relative to the various controls and accessories information supplied by qualified manufacturers. Special attention is given to the application of fluidic control techniques to small gas turbine enginer. The report contains conclusions and recommendations relative to obtaining an advanced generation of controls and accessories for small engines. Particular attention is given to improved packaging of the controls and accessories with emphasis on decreasing weight and volume and improvement in maintainability. Engine starting is investigated in detail and it is concluded that a hand charged hydraulic accumulator/hydraulic motor-pump arrangement best meets the requirements of minimum weight, self-sufficiency and austere site operation. (Author)
AD-652 896 HC$3.00 MF$0.65

PORTABLE TOTAL ENERGY PACKAGE FOR ADVANCED BASE FUNCTIONAL COMPONENTS.

Group 21E — Jet and gas turbine engines

Technical rept.,
Naval Civil Engineering Lab Port Hueneme Calif
John S. Williams. Jun 67, 49p Rept no. NCEL-TR-530

Descriptors: (*Gas turbines, *Portable), Gas generator engines, Heat, Corrosion, Energy, Diesel engines, Electrical properties, High-temperature research, Power, Marine engineering, Costs.

Under consideration is the concept of a total energy package consisting of a gas-turbine-driven generator and a waste-heat boiler for use in the advanced base functional component system. The results of a survey show that a total energy package will probably not provide balanced heat and electrical energy demands, making the small gas turbine a poor logistic and economic choice for a prime mover. Suggestions are offered for the utilization of waste heat from diesel generators, where feasible. Included in the report as an Appendix is a literature study of high-temperature corrosion of turbine blading in a marine atmosphere. (Author)
AD-653 081 HC$3.00 MF$0.65

PARAMETRIC STUDY OF ADVANCED MULTISTAGE AXIAL-FLOW COMPRESSORS.
General Motors Corp., Indianapolis, Ind. Allison Div.
A. C. Bryans, and M. L. Miller. May 67, 65p
NASA-CR-797
Contract NAS3-7277

Descriptors: *Axial flow compressor, *Pressure ratio, Axial, Compressor, Design, Diffusion, Equilibrium, Flow, Inlet, Length, Path, Pressure, Radial, Ratio, Rotor, Tip, Vortex.

For abstract, see STAR 05 14.
N67-27301 HC$3.00 MF$0.65

21F. NUCLEAR PROPULSION

SNAP 10A SYSTEM OPTIMIZATION,
Atomics International, Canoga Park, Calif.
P. L. Soske. 1 Aug 66, 247p
Contract AT (11-1)-GEN-8

Descriptors: (*Auxiliary power plants, Optimization), (*Thermoelectricity, Auxiliary power plants).

For abstract, see NSA 21 02.
NAA-SR-11935 HC$3.00 MF$0.65

21H. ROCKET MOTORS AND ENGINES

OPTIMUM THRUST NOZZLE CONTOURS FOR CHEMICALLY REACTING GAS FLOWS.
Purdue Univ., Lafayette, Ind. Jet Propulsion Center.
J. D. Hoffman. Apr 66, 107p NASA-CR-84159, TM-66-3
Grant NSG-592

Descriptors: *Gas flow, *Rocket nozzle, *Supersonic nozzle, *Thrust, Differential, Equation, Flow, Gas, Lagrange multiplier, Nozzle, Nozzle design, Optimization, Partial, Pressure, Rocket, Supersonic.

For abstract, see STAR 05 14.
N67-26505 HC$3.00 MF$0.65

HIGH ENERGY PROPELLANTS - A CONTINUING BIBLIOGRAPHY WITH INDEXES.
National Aeronautics and Space Administration, Washington, D. C.
Apr 67, 146p NASA-SP-7002/03/

Descriptors: *Abstract, *Bibliography, *High energy propellant, *Propellant oxidizer, Combustion, Handling, High energy, Hybrid, Index, Liquid, Oxidizer, Propellant, Property, Safety, Solid, Storage, Toxicity.

For abstract, see STAR 05 14.
N67-27224 HC$3.00 MF$0.65

AN EXPERIMENTAL CORRELATION OF THE NONREACTIVE PROPERTIES OF INJECTION SCHEMES AND COMBUSTION EFFECTS IN A LIQUID-PROPELLANT ROCKET ENGINE. PART II. INSTRUMENTATION, EXPERIMENTAL APPARATUS, AND EXPERIMENTAL TECHNIQUES.
Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
R. M. Clayton, F. G. Gerbracht, and J. H. Rupe.
15 May 67, 39p NASA-CR-84302, JPL-TR-32-255
Contract NAS7-100

Descriptors: *Combustion, *Injector, *Liquid propellant rocket engine, Accuracy, Apparatus, Chamber, Design, Heat transfer, Instrumentation, Liquid, Measurement, Nozzle, Propellant, Rocket engine, Thermochemistry, Thrust.

For abstract, see STAR 05 14.
N67-27232 HC$3.00 MF$0.65

M-1 INJECTOR DEVELOPMENT - PHILOSOPHY AND IMPLEMENTATION.
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
E. W. Conrad, T. W. Godwin, and W. A. Tomazic.
1967, 21p NASA-TM-X-52289
To Be Presented At 3d Propulsion Joint Specialists Conf. of the Aiaa, Washington, D. C., 17-18 Jul. 1967

Descriptors: *Combustion efficiency, *Fuel injection, *Injector, *Scale model, *Test firing, Acoustic, Combustion, Design, Efficiency, Firing, Fuel, Hydraulic, Injection, Model, Performance, Scale, Stability, Temperature, Test.

For abstract, see STAR 05 14.
N67-27238 HC$3.00 MF$0.65

INVESTIGATION OF A SUBMERGED NOZZLE ON A 1/14.2-SCALE MODEL OF THE 260-INCH SOLID ROCKET.
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
J. J. Pelouch, Jr., and R. J. Salmi. May 67, 16p
NASA-TM-X-1388
Contract 728-00-00-01-22

Descriptors: *Exhaust gas, *Flow characteristics, *Rocket nozzle, *Submerged body, Aerodynamics, Air, Asymmetry, Body, Characteristics, Exhaust, Flow, Gas, Grain, Model, Nozzle, Port, Propellant, Rocket, Scale, Simulation, Solid, Submerged, Turbulence.

For abstract, see STAR 05 14.
N67-27265 HC$3.00 MF$0.65

EXPERIMENTAL EVALUATION OF HIGH-PURITY-SILICA REINFORCED ABLATIVE COMPOSITES AS NOZZLE SECTIONS OF 7.8-INCH-/19.8 CM/ DIAMETER THROAT STORABLE-PROPELLANT ROCKET ENGINE.
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
D. A. Peterson. Jun 67, 28p NASA-TM-X-1391
Contract 128-31-03-01-22

Descriptors: *Ablating material, *Rocket nozzle, *Silicon oxide, *Storable propellant, Ablation, Char, Composite, Erosion, Evaluation, Material, Nozzle, Oxide, Propellant, Rate, Reinforced, Rocket engine, Section, Silicon, Storage.

For abstract, see STAR 05 14.
N67-27286 HC$3.00 MF$0.65

21I. ROCKET PROPELLANTS

PROPELLANTS AND COMBUSTION: COMPILATION OF ABSTRACTS.
Library of Congress Washington D C Aerospace Technology Div
For primary bibliographic entry see Field 21B.
AD-652 845 HC$3.00 MF$0.65

THIN FILM PERSONAL DOSIMETERS FOR DETECTING TOXIC PROPELLANTS.
Magna Corp Redondo Beach Calif Research and Development Div
For primary bibliographic entry see Field 6T.
AD-652 849 HC$3.00 MF$0.65

INVESTIGATION OF CHARGED COLLOID BEAMS FOR ELECTROSTATIC PROPULSION FINAL REPORT.
Cosmic, Inc., Washington, D. C.
For primary bibliographic entry see Field 21C.
For abstract, see STAR 05 14.
N67-26640 HC$3.00 MF$0.65

HYDRAZINE-NITRATE-HYDRAZINE AS A MONERGOLIC PROPELLANT, PART II.
Das System Hydazinnitrat-hydrazin Als Monergoler Treibstoff, 2. Teil
Deutsche Versuchsanstalt Fur Luft- Und Raumfahrt, Stuttgart (West Germany). Institut Fur Raketentreibstoffe.
F. Bachmaier. Mar 67, 22p DLV-617, DLR-FB-67-22
in German, English Summary

Descriptors: *Hydrazide, *Hydrazine nitrate, *Propellant property, Chemistry, Conductivity, Container, Decomposition, Density, Hydrazine, Material, Nitrate, Propellant, Property, Rocket, Solution, Temperature, Thermal, Viscosity.

For abstract, see STAR 05 14.
N67-27130 HC$3.00 MF$0.65

SATURATED HYDROCARBON POLYMERIC BINDER FOR ADVANCED SOLID PROPELLANT AND HYBRID SOLID GRAIN QUARTERLY REPORT, 1 NOV. 1966 - 31 JAN. 1967.
Union Carbide Corp., Bound Brook, N. J. Plastics Div.
For primary bibliographic entry see Field 7C.
For abstract, see STAR 05 14.
N67-27428 HC$3.00 MF$0.65

22. SPACE TECHNOLOGY

22A. ASTRONAUTICS

GRAVITATIONAL EQUILIBRIA OF A RIGID BODY CONTAINING SYMMETRIC ROTORS.
California Univ., Los Angeles.
W. W. Hooker, and R. E. Roberson. 1966, 14p
NASA-CR-80354
Contract NGR-05-007-099
Presented At The Intern. Astronautical Congr., Madrid, Oct. 1966 Submitted For Publication

Descriptors: *Equilibrium, *Gravitational field, *Rigid body, *Rotor, Axis, Body, Circular, Con-

stant, Field, Fixed, Gravitational, Gyrostat, Inverse, Orbit, Rigid, Speed, Square, Symmetry.

For abstract, see STAR 05 03.
N67-12981 HC$3.00 MF$0.65

REVIEW OF NASA SPONSORED RESEARCH AT THE EXPERIMENTAL ASTRONOMY LABORATORY.
Massachusetts Inst. of Tech., Cambridge. Experimental Astronomy Lab.
For primary bibliographic entry see Field 22C.
For abstract, see STAR 05 14.
N67-26521 HC$3.00 MF$0.65

THERMAL CONTROL CONSIDERATIONS FOR A MANNED ORBITING SPACE STATION.
National Aeronautics and Space Administration. Manned Spacecraft Center, Houston, Tex.
J. T. Taylor. May 67, 48p NASA-TN-D-3995
Contract 981-10-10-05-72

Descriptors: *Heat flux, *Manned orbital space station (moss), *Space radiator, *Temperature control, *Thermal property, Activity, Analysis, Balance, Coating, Control, Electric, Equilibrium, Flux, Heat, Load, Passive, Power, Property, Radiator, Space, Temperature, Thermal.

For abstract, see STAR 05 14.
N67-26551 HC$3.00 MF$0.65

RETRIEVABLE MARS PROBE DEFINITION.
Brown Engineering Co., Inc., Huntsville, Ala.
F. Godwin. 17 May 67, 157p NASA-CR-61172
Contract NAS8-20073

Descriptors: *Flyby mission, *Mars probe, *Soil, Flyby, Manned, Mars (planet), Mission, Probe, Retrieval, Spacecraft, Surface.

For abstract, see STAR 05 14.
N67-26635 HC$3.00 MF$0.65

MONTE CARLO SIMULATION FOR APOLLO GO, NO- GO VERIFICATION.
National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
B. Kaufman. Feb 67, 24p NASA-TM-X -55776, X-507-67-61

Descriptors: *Apollo project, *Monte carlo method, *Simulation, Flight, Least, Orbit, Parking, Path, Perturbation, Random, Speed, Square, Table.

For abstract, see STAR 05 14.
N67-26639 HC$3.00 MF$0.65

GODDARD 1965 - A YEAR IN REVIEW AT GODDARD SPACE FLIGHT CENTER NATIONAL AERONAUTICS AND SPACE ADMINISTRATION.
National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
1965, 116p NASA-TM-X-59680

Descriptors: *Chronology, *History, *Satellite launching, Acquisition, Computer, Data, Launching, Nasa program, Network, Probe, Satellite, Space, Support, Tracking, Weather.

For abstract, see STAR 05 14.
N67-26976 HC$3.00 MF$0.65

MANNED VENUS ORBITING MISSION.
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
E. A. Willis, Jr.. 1967, 21p NASA-TM-X-52311

Descriptors: *Launch date, *Manned space flight, *Orbital calculation, *Planetary space flight, *Venus, Calculation, Circular, Constraint, Date, Departure, Ellipse, Launch, Manned, Mission, Orbital, Parking, Planetary, Space flight, Weight.

For abstract, see STAR 05 14.
N67-27239 HC$3.00 MF$0.65

AN EXPERIMENTAL INVESTIGATION OF TWO VISUAL METHODS OF ALTITUDE DETERMINATION.
National Aeronautics and Space Administration . Langley Research Center, Langley Station, Va.
For primary bibliographic entry see Field 5H.
For abstract, see STAR 05 14.
N67-27266 HC$3.00 MF$0.65

DYNAMIC SIMULATION OF LUNAR MODULE DOCKING WITH APOLLO COMMAND MODULE IN LUNAR ORBIT.
National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
For primary bibliographic entry see Field 14B.
For abstract, see STAR 05 14.
N67-27272 HC$3.00 MF$0.65

LUNAR SURFACE STUDIES - A CONTINUING BIBLIOGRAPHY WITH INDEXES.
National Aeronautics and Space Administration, Washington, D. C.
For primary bibliographic entry see Field 3B.
For abstract, see STAR 05 14.
N67-27297 HC$3.00 MF$0.65

GALACTIC JUPITER PROBES.
National Aeronautics and S ace Administration. Goddard Space Flight Center, Greenbelt, Md.
J. F. Clark, E. W. Hymowitz, and J. H. Trainor. Mar 67, 16p NASA-TM-X-55785, X-100-67-211

Descriptors: *Flyby mission, *Jupiter (planet), *Space probe, Asteroid, Belt, Communications, Design, Flyby, Launch vehicle, Meteoroid, Mission, Payload, Probe, Radiation, Reliability, Space, System, Thermal, Trajectory.

For abstract, see STAR 05 14.
N67-27308 HC$3.00 MF$0.65

THE FEASIBILITY OF AN ORBITING 1500-METER RADIOTELESCOPE.
Astro Research Corp., Santa Barbara, Calif.
W. M. Robbins, Jr.. Jun 67, 23p NASA-CR-792
Contract NAS7-426

Descriptors: *Aluminum, *Parabolic reflector, *Radio telescope, Antenna, Array, Central, Column, Compression, Configuration, Control, Current, Deformation, Deployment, Earth, Environmegt, Fabrication, Field, Magnetic, Network, Operation, Orbit, Parabolic, Radio, Reflector, Ribbon, Scanning, Stress, Telescope, Torque.

For abstract, see STAR 05 14.
N67-27620 HC$3.00 MF$0.65

SPACE PROGRAMS SUMMARY 37-44, VOLUME VI FOR THE PERIOD JANUARY 1, 1967 TO FEBRUARY 28, 1967. SPACE EXPLORATION PROGRAMS AND SPACE SCIENCES.
Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
31 Mar 67, 35p NASA-CR-84519, JPL-SPS-37-44, VOL. VI
Contract NAS7-100

Descriptors: *Deep space network (dsn), *Mariner program, *Surveyor project, Communication, Control, Deep, Design, Dsif, Equipment, Facility, Ground, Instrumentation, Mars project, Network, Propulsion, Space, Spacecraft, Station, Support, System, Temperature.

For abstract, see STAR 05 14.
N67-27741 HC$3.00 MF$0.65

22B. SPACECRAFT

EARLY RESULTS FROM THE TOPSIDE SOUNDER IN THE ALOUETTE II SATELLITE,
Defence Research Telecommunications Establishment Ottawa (Ontario) Radio Physics Lab
For primary bibliographic entry see Field 4A.
AD-652 759 Not available from CFSTI.

THE 5E-5 RUBIDIUM-85 VAPOR MAGNETOMETER.
Johns Hopkins Univ Silver Spring Md Applied Physics Lab
For primary bibliographic entry see Field 8N.
AD-652 807 HC$3.00 MF$0.65

CHANDRASE HAR'S PLANETARY PROBLEM WITH INTERNAL SOURCES,
Ranu Corp Santa Monica Calif
For primary bibliographic entry see Field 3B.
AD-652 832 HC$3.00 MF$0.65

AERODYNAMIC AND FLIGHT PERFORMANCE ANALYSIS FOR THE NIRO SOUNDING ROCKET,
Space-General Corp El Monte Calif
J. P. Taylor, and R. P. Arnold. Mar 66, 178p Rept no. Scientific-1
AFCRL-66-460
Contract AF 19 (628)-5520
See also AD-641 676, Appendix A and AD-652 842, Appendix B.

Descriptors: (*Sounding rockets, Flight testing), Aerodynamic characteristics, Performance (Engineering), Propulsion, Aeroelasticity, Payload, Flight paths, Trajectories, Altitude.
Identifiers: NIRO sounding rocket.

Contained in the report are the aerodynamic and performance characteristics for the NIRO vehicle. Presented are the linear aerodynamic characteristics of the rigid vehicle, and aeroelastic corrections. Data are presented for two different payload diameters, and varying payload lengths. Also given are the pertinent vehicle inertial and propulsive data. The main volume is principally concerned with the overall aerodynamic, inertial and propulsion characteristics of the vehicle, with summary of performance data. (Author)
AD-652 836 HC$3.00 MF$0.65

AERODYNAMIC AND FLIGHT PERFORMANCE ANALYSIS FOR THE NIRO SOUNDING ROCKET. APPENDIX B,
Space-General Corp El Monte Calif
J. P. Taylor. Mar 66, 112p Rept no. Scientific-1-App-B, SGC-916FR-1
AFCRL-66-460-B
Contract AF 19 (628)-5520
See also AD-652 836, and AD-641 676, Appendix A.

Descriptors: (*Sounding rockets, Flight testing), Aerodynamic characteristics, Performance (Engineering), Propulsion, Aeroelasticity, Payload, Flight paths, Trajectories, Altitude.
Identifiers: NIRO sounding rocket.

Contained in the report are the aerodynamic and performance characteristics for the NIRO vehicle. Presented are the linear aerodynamic characteristics of the rigid vehicle and aeroelastic corrections. Data are presented for two different payload diameters of varying lengths. Also given are pertinent vehicle inertial and propulsion data. (Author)
AD-652 842 HC$3.00 MF$0.65

AN AUTOMATIC-ELECTRO OPTICAL SATELLITE TRIANGULATION SYSTEM.
Army Engineer Geodesy Intelligence and Mapping Research and Development Agency Fort Belvoir Va
For primary bibliographic entry see Field 8E.
AD-652 882 HC$3.00 MF$0.65

ANISOTROPIC PROPAGATION OF SOLAR PROTONS DEDUCED FROM SIMULTANEOUS OBSERVATIONS BY EARTH SATELLITES AND THE MARINER IV SPACE PROBE,
Chicago Univ Ill Enrico Fermi Inst for Nuclear Studies
For primary bibliographic entry see Field 3B.
AD-652 951 Not available from CFSTI.

OPERATION MANUAL FOR STRATOSPHERE TEMPERATURE SONDE,
Atmospheric Sciences Lab White Sands Missile Range N Mex
For primary bibliographic entry see Field 4A.
AD-653 003 HC$3.00 MF$0.65

ON THE SCIENTIFIC USE OF A SATELLITE RADAR SYSTEM.
Naval Research Lab Washington D C
For primary bibliographic entry see Field 4A.
AD-653 065 HC$3.00 MF$0.65

FIRE PROTECTION FOR OXYGEN ENRICHED ATMOSPHERE APPLICATIONS,
Air Force Aero Propulsion Lab Wright-Patterson AFB Ohio
For primary bibliographic entry see Field 13L.
AD-653 113 HC$3.00 MF$0.65

PASSIVE GEODETIC SATELLITE CANISTER ASSEMBLIES.
Goodyear Aerospace Corp., Akron, Ohio.
R. R. Carman, and J. O. Gibson. Jan 67, 63p NASA-CR-700
Contract NAS1-4971

Descriptors: *Component reliability, *Environmental testing, *Pageos, *Structural engineering, Assembly, Canister, Component, Dynamic, Engineering, Environment, Fabrication, Flight, Hardware, Prototype, Qualification, Reliability, Stability, Static, Structural, Testing, Thermal.

For abstract, see STAR 05 06.
N67-15669 HC$3.00 MF$0.65

MARINER MARS 1964 TEMPERATURE CONTROL HARDWARE DESIGN AND DEVELOPMENT.
Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
W. Carroll, G. G. Coyle, and H. Von Delden. 1 Jun 67, 30p NASA-CR-84293, JPL-TR-32-955
Contract NAS7-100

Descriptors: *Heat shield, *Mariner iv space probe, *Surface finish, *Temperature control, Antenna, Coating, Configuration, Control, Design, Finish, Heat, Louver, Material, Paint, Shield, Simulator, Surface, Temperature, Thermal.

For abstract, see STAR 05 14.
N67-26581 HC$3.00 MF$0.65

A "HUMMINGBIRD" FOR THE L2 LUNAR LIBERATION POINT.
National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
F. O. Vonbun. Apr 67, 22p NASA-TM-X-55778, X-507-67-167

Descriptors: *Communications satellite, *Libration, *Lunar satellite, Acceleration, Back, Communications, Earth, Engine, Field, Force, Impulse, Lunar, Mathematics, Motion, Point, Rotation, Specific, Tracking.

For abstract, see STAR 05 14.
N67-26585 HC$3.00 MF$0.65

AIMP (IMP-D) TECHNICAL SUMMARY DESCRIPTION.
National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
Mar 67, 98p NASA-TM-X-55770, X-724-67-87

Descriptors: *Experiment design, *Explorer xxxiii satellite, *Satellite instrumentation, *Subsystem, Aspect, Data, Design, Experiment, Instrumentation, Onboard, Optical, Power, Programmer, Satellite, Structure, System, Telemetry.

For abstract, see STAR 05 14.
N67-26592 HC$3.00 MF$0.65

ANALYSIS OF TRANSPORTATION SYSTEMS FOR SPACE STATION LOGISTICS.
National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
R. E. Valentine. 6 Apr 67, 83p NASA-TM-X-53594

Descriptors: *Cost estimate, *Logistics, *Space station, Analysis, Apollo spacecraft, Cargo, Command, Cost, Duration, Estimate, Graph, Launch vehicle, Manned, Matrix, Mission, Model, Module, Saturn i launch vehicle, Sensitivity, Space, Spacecraft, Station, Transportation.

For abstract, see STAR 05 14.
N67-26593 HC$3.00 MF$0.65

COMMUNICATIONS SATELLITES.
National Aeronautics and Space Administration, Washington, D. C.
May 67, 96p NASA-SP-7004/03/

Descriptors: *Bibliography, *Communications satellite, Annotation, Author, Communications, Economics, Index, Multiple, Orbit, Random, Satellite, Station, System, Telemetry, Television.

For abstract, see STAR 05 14.
N67-26600 HC$3.00 MF$0.65

EXTERNAL NOISE AND ANTENNA NOISE TEMPERATURES IN THE 136 AND 400- M HZ SATELLITE FREQUENCY HANDS.
Deutsche Versuchsanstalt Fur Luft- Und Raumfahrt, Oberpfaffenhofen (West Germany). Institut Fuer Flugfunk Und Mikrowellen.
For primary bibliographic entry see Field 17B.
For abstract, see STAR 05 14.
N67-27260 HC$3.00 MF$0.65

APPLICATION OF THE STORED-PROGRAM COMPUTER TO SMALL SCIENTIFIC SPACECRAFT.
National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
For primary bibliographic entry see Field 9B.
For abstract, see STAR 05 14.
N67-27275 HC$3.00 MF$0.65

OPTICAL AND MICROWAVE COMMUNICATIONS - A COMPARISON.
National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
F. Kalil. Jun 67, 46p NASA-TN-D-3984
Contract 125-06-02-00-51

Descriptors: *Microwave transmission, *Millimeter wave, *Optical tracking, *Spacecraft communications system, Communications, Mars, Microwave, Millimeter, Optical, Radio, S-band, Space, Spacecraft, System, Tracking, Transmission, Wave.

For abstract, see STAR 05 14.
N67-27287 HC$3.00 MF$0.65

NONMAGNETIC, EXPLOSIVE ACTUATED INDEXING DEVICE.
National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
J. P. Bauernschub, Jr.. Jun 67, 14p NASA-TN-D-3914
Contract 811-12-00-01-51

Descriptors: *Actuator, *Magnetometer, *Pioneer space probe, Device, Explosive, Index, Motor, Nonmagnetic, Pioneer vi space probe, Pioneer vii space probe, Piston, Probe, Space, Spacecraft, Step.

For abstract, see STAR 05 14.
N67-27288 HC$3.00 MF$0.65

PULSE-TRAIN GENERATOR FOR ROCKET CAMERA.
National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
For primary bibliographic entry see Field 14E.
For abstract, see STAR 05 14.
N67-27293 HC$3.00 MF$0.65

TETHER MANAGEMENT CONSIDERATIONS FOR AAP-4.
Bellcomm, Inc., Washington, D. C.
W. W. Hough. 13 Apr 67, 22p NASA-CR-84430, TM-67-102-1

Descriptors: *Apollo applications program (aap), *Tetherline, Aap, Attitude, Gradient, Gravity, Lunar, Management, Module, Mount, Stability, Telescope, Wrap.

For abstract, see STAR 05 14.
N67-27704 HC$3.00 MF$0.65

MULTIPLE ACCESS RELAYING FOR A SYNCHRONOUS OPERATIONAL METEOROLOGICAL SATELLITE.
Telcom, Inc., Arlington, Va.
14 Sep 66, 94p TER-116

Descriptors: (*Meteorological satellites, *Data transmission systems), Transponders, Meteorological parameters, Sensors, Television communication systems, Systems engineering.

The report details conceptual system analysis for multipurpose communication utilization of a Synchronous Operational Meteorological Satellite (SOMS). A recommended system is evolved which is expected to meet projected requirements through the 1971 time frame in three functions: (a) Transmission of high-resolution photographs to specified ground stations. (b) Interrogation of and data collection from approximately 12,500 remote stations and automatic sensors. (c) Dissemination of finished data products to and among world, regional and national centers and to local stations. The necessary functions are projected for accomplishment with the power and weight budgets of a synchronous vehicle equivalent to the Hughes HS-303A satellite. (Author)
PB-173 764 HC$3.00 MF$0.65

RELATIONSHIP BETWEEN THE TANGENTIAL WIND FIELD AND THE TRANSVERSE CIRCULATIONS OF TROPICAL CYCLONES.
Hawaii Inst. of Geophysics, Honolulu.
For primary bibliographic entry see Field 4B.
PB-174 801 HC$3.00 MF$0.65

22C. SPACECRAFT TRAJECTORIES AND REENTRY

SPACE REFERENCE SYSTEMS.
Aeronautical Chart and Information Center, St. Louis, Mo.
For primary bibliographic entry see Field 17G.
AD-644 222 HC$3.00 MF$0.65

A DELAYED COMMAND SYSTEM FOR A NEAR-EARTH SATELLITE.
Master's thesis,
Johns Hopkins Univ Silver Spring Md Applied Physics Lab
Richard S. Cooperman. Apr 67, 99p Rept no. TG-896
Contract NOw-62-0604

Descriptors: (*Spacecraft, *Geodesics), (*Triangulation, Accuracy), Satellites (Artificial), Integrated circuits, Magnetic core storage, Computer storage devices, Wiring diagrams, Modules (Electronics), Reliability (Electronics), Packaging, Real time, Clocks, Earth (Planet), Gravity, Command + control systems, Stars, Night photography.

The paper describes a digital solid-state delayed command system using a high-accuracy real-time clock designed for near-earth satellites. The system was designed to control the operation of the optical beacon geodesy experiment on the GEOS B Satellite. Extensive use has been made of high-reliability low-power monolithic integrated circuits for processing and clock circuits; a small magnetic-core memory has been used for data storage. In its present configuration the system can remotely initiate up to 59 separate optical beacon operations per command message. Operations are initiated coincident with any satellite generated minute mark; satellite minute marks are mnintained within plus or minus 10 microseconds of universal time. Satellite minute markers are transmitted on three separate carrier frequencies to provide accurate time information on a world-side basis. System and logical design details are presented.
AD-652 816 HC$3.00 MF$0.65

A REFERENCE ORBIT USEFUL IN INTEGRATING BETWEEN ACTIVITY SPHERES.
Revised ed.,
Texas Univ Austin Dept of Electrical Engineering
Robert H. Flake, and John Graham Hartwell. 7 Nov 66, 3p
AFOSR-67-1170
Grant AF-AFOSR-766-66
Revision of manuscript submitted 2 Sep 66. Prepared in cooperation with Brown (D.) Associates, Eau Gallie, Fla.
Availability: Published in AIAA Journal v5 n3 p599-500 Mar 1967.

Descriptors: (*Orbital trajectories, Perturbation theory), Space probes, Lunar trajectories, Equations of motion, Ascent trajectories, Center of mass.
Identifiers: Activity spheres.

Recent interest has developed in utilizing more accurate reference orbits in conjunction with existing special perturbation techniques. A simple reference orbit is suggested in this discussion which is useful in integrating through the boundaries of activity spheres. (Author)
AD-653 053 Not available from CFSTI.

AN ELEMENTARY DERIVATION OF THE PRINCIPAL EFFECTS OF THE OBLATENESS OF THE EARTH UPON THE ORBITS OF SATELLITES.
Naval Postgraduate School Monterey Calif
For primary bibliographic entry see Field 3C.
AD-653 078 HC$3.00 MF$0.65

SOLUTION OF THE RESTRICTED PROBLEM OF THREE BODIES BY POWER SERIES,
Yale Univ New Haven Conn Observatory
For primary bibliographic entry see Field 20K.
AD-653 301 Not available from CFSTI.

CRITERION FOR APPLICATION OF THE DIFFERENTIAL DOPPLER METHOD,
American Museum of Natural History New York Dept of Animal Behavior
For primary bibliographic entry see Field 20N.
AD-653 348 Not available from CFSTI.

REVIEW OF NASA SPONSORED RESEARCH AT THE EXPERIMENTAL ASTRONOMY LABORATORY .
Massachusetts Inst. of Tech., Cambridge. Experimental Astronomy Lab.
R. G. Stern. Jan 67, 125p NASA-CR-84291, PR-3
Contract NAS12-501, Grant NSG-254-62

Descriptors: *Interplanetary trajectory, *Nasa program, *Navigation and guidance, *Problem solving, *Spacecraft trajectory, *Star tracker, Astronomical observatory, Conference, Guidance, Hyperbolic reentry, Interplanetary, Navigation, Optimal control, Orbital rendezvous, Problem, Program, Quadratic equation, Satellite orbit, Solution, Spacecraft, Trajectory.

For abstract, see STAR 05 14.
N67-26521 HC$3.00 MF$0.65

APPLICATION OF THE PONTRYAGIN MAXIMUM PRINCIPLE TO FLIGHT IN A VACUUM.
Anwendung der Pontrjaginschen Maximumprinzips Auf Fluege Im Luftleeren Raum
National Aeronautics and Space Administration, Washington, D. C.
G. Steinmetz. Feb 67, 9p NASA-TT-F-10745
Transl. Into English From the German Report, Dec. 1965

Descriptors: *Ascent trajectory, *Dynamic programming, *Pontryagin principle, *Variational calculus, Ascent, Calculus, Consumption, Dynamic, Earth, Fuel, Gradient, Method, Optimization, Orbit, Programming, Rocket, Trajectory, Vacuum, Variation.

For abstract, see STAR 05 14.
N67-26627 HC$3.00 MF$0.65

PERIODIC AND ALMOST PERIODIC TRAJECTORIES IN CISLUNAR SPACE FINAL REPORT.
General Precision, Inc., Little Falls, N. J.
Apr 67, 87p NASA-CR-83983
Contract NAS8-20062

Descriptors: *Approximation method, *Cislunar space, *Dynamic stability, *Flight safety, *Periodic orbit, *Trajectory analysis, Analysis, Apollo spacecraft, Approximation, Body, Cislunar, Computer, Concept, Coordinate, Digital, Dynamic, Earth-moon system, Flight, Hamiltonian, Integration, Lagrange coordinate, Method, Normalization, Numerical, Orbit, Periodic, Problem, Program, Rescue, Rotation, Safety, Solution, Space, Spacecraft, Stability, Three, Trajectory, Transformation, Unmanned.

For abstract, see STAR 05 14.
N67-27174 HC$3.00 MF$0.65

A PRELIMINARY ANALYSIS OF ORBIT INSERTION GUIDANCE FOR THE VOYAGER MISSION.
National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
C. R. Flint. 26 Apr 67, 23p NASA-TM-X-53601

Descriptors: *Optimum thrust programming, *Planetary orbit, *Spacecraft guidance, *Voyager project, Accuracy, Analysis, Efficiency, Error, Guidance, Insertion, Law, Maneuver, Optimum, Orbit, Planetary, Programming, Propellant, Spacecraft, Terminal, Thrust.

For abstract, see STAR 05 14.
N67-27229 HC$3.00 MF$0.65

A SET OF UNIFORM VARIATIONAL PARAMETERS FOR SPACE TRAJECTORY ANALYSIS.
Analytical Mechanics Associates, Westbury, N.Y.
A. Bailie, S. Pines, and H. Wolf. Feb 67, 38p
NASA-CR-84484, REPT.-67-5
Contract NAS5-9085

Descriptors: *Orbit calculation, *Trajectory analysis, Analysis, Calculation, Correction, Differential, Energy, Matrix, Orbit, Parameter, Rotation, Scheme, Set, Space, Trajectory, Transformation, Uniform, Variation, Vector.

For abstract, see STAR 05 14.
N67-27642 HC$3.00 MF$0.65

22D. SPACECRAFT LAUNCH VEHICLES AND GROUND SUPPORT

ORBITAL INVESTIGATION OF PROPELLANT DYNAMICS IN A LARGE ROCKET BOOSTER.
National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
H. J. Buchanan, and F. M. Bugg. May 67, 21p
NASA-TN-D-3968
Contract 932-40-03-00-62

Descriptors: *Dynamics, *Liquid hydrogen, *Propellant tank, *Saturn s- ivb stage, Acceleration, Boost, Coast, Data, High gravity, Hydrogen, Liquid, Low, Low gravity, Orbital, Oscillation, Propellant, Sloshing, Tank.

For abstract, see STAR 05 14.
N67-26546 HC$3.00 MF$0.65

SLOSH DYNAMICS STUDY IN NEAR ZERO GRAVITY - DESCRIPTION OF VEHICLE AND SPACECRAFT.
National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
H. Gold, J. G. Mc Ardle, and D. A. Petrash. May 67, 28p NASA-TN-D-3985
Contract 124-09-03-01-22

Descriptors: *Dynamics, *Flight test, *Sloshing, *Wasp rocket, *Weightlessness, Baffle, Damping, Flight, Gravity, Liquid, Location, Near, Performance, Test, Vehicle, Zero.

For abstract, see STAR 05 14.
N67-26547 HC$3.00 MF$0.65

ADVANCED SPACE INFORMATION SYSTEMS.
National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
For primary bibliographic entry see Field 9B.
For abstract, see STAR 05 14.
N67-26587 HC$3.00 MF$0.65

GROUNDING OF ROCKET EXPERIMENTS.
National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
G. D. Harris. Feb 67, 14p NASA-TM-X-55768, X-614-67-42

Descriptors: *Aerobee rocket, *Electric grounding, *Rocket engine noise, Amplifier, Circuit, Compatibility, Construction, Design, Electric, Experiment, Ground, Noise, Protection, Rocket engine, Signal.

For abstract, see STAR 05 14.
N67-26591 HC$3.00 MF$0.65

EFFECTIVENESS OF ENVIRONMENT-SIMULATION TESTING FOR SPACECRAFT.
National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
For primary bibliographic entry see Field 14B.
For abstract, see STAR 05 14.
N67-27222 HC$3.00 MF$0.65

AN INVESTIGATION OF THE RESPONSE OF A SCALED MODEL OF A LIQUID-PROPELLANT MULTISTAGE LAUNCH VEHICLE TO LONGITUDINAL EXCITATION.
National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va. W. M. Thompson, Jr.. May 67, 68p NASA-TN-D-3975

Descriptors: *Liquid propellant rocket engine, *Multistage rocket vehicle, *Scale model, *Vibration, Dimensional, Excitation, Flight, Launch vehicle, Liquid, Loading, Longitudinal, Mode, Model, Multistage, Propellant, Scale, Simulation, Sinusoid, Structural, Time, Two.

For abstract, see STAR 05 14.
N67-27415 HC$3.00 MF$0.65

PEGASUS DETECTOR SYSTEM EVALUATION TOOL FINAL REPORT.
Neo tec Corp., Rockville, Md.
9 Mar 67, 100p NASA-CR-84431, CR-3.1
Contract NAS8-20647

Descriptors: *Pegasus satellite, *Spacecraft electronic equipment, *Test equipment, Detector, Electronic, Equipment, Impact, Meteoroid, Panel, Simulation, Spacecraft, System, Test, Tool.

For abstract, see STAR 05 14.
N67-27440 HC$3.00 MF$0.65

* U.S. GOVERNMENT PRINTING OFFICE : 1967 OL—305-085 (2)

REPORT LOCATOR LIST

This list comprises all the reports cited in this issue. It is arranged alpha-numerically by accession number. The COSATI field and group where the report citation can be located in this issue precedes the accession number.

17B AD-119 605
15B AD-209 136
18M AD-227 715
5E AD-240 002
13H AD-296 519
6S AD-401 646
6R AD-401 763
14B AD-416 310
15F AD-441 983
20M AD-444 078
4A AD-444 660
20C AD-444 793
17B AD-449 487
5J AD-450 707
9A AD-451 545
19E AD-455 070
5I AD-455 302
17I AD-455 767
5I AD-456 738
1A AD-457 591
9E AD-458 148
20I AD-459 651
9B AD-460 387
20L AD-461 132
9E AD-461 670
15C AD-462 043
11I AD-463 790
5K AD-465 043
20D AD-465 240
21E AD-466 202
13F AD-467 165
15G AD-468 851
6P AD-471 457
5J AD-472 122
20D AD-473 841
14B AD-473 860
5I AD-477 646
5I AD-477 767
20D AD-477 798
20D AD-478 179
5J AD-478 519
17I AD-479 308
5B AD-479 679
5J AD-479 819
14E AD-480 533
5J AD-482 390
20K AD-486 798
13B AD-486 830
13L AD-488 404
20D AD-492 093
20D AD-641 302
8K AD-641 312
11C AD-641 314
12A AD-641 323
6C AD-642 777
9A AD-642 809
9A AD-642 810
11K AD-642 834
20B AD-643 486
5J AD-643 498
5J AD-643 499
17G AD-643 531
7C AD-643 548
4B AD-643 554
11E AD-644 193
9E AD-644 203
11D AD-644 219
17G AD-644 222
6S AD-644 224
5A AD-644 226

14B AD-645 764
7D AD-645 803
12A AD-645 831
6E AD-645 898
5J AD-646 360
9C AD-646 370
21D AD-646 382
14B AD-646 388
5E AD-646 443
5E AD-646 459
8C AD-646 501
10C AD-652 698
9E AD-652 699
10C AD-652 700
9A AD-652 701
4B AD-652 702
6E AD-652 703
6A AD-652 704
6L AD-652 705
5J AD-652 706
6R AD-652 707
6R AD-652 708
8L AD-652 709
8L AD-652 710
8I AD-652 711
8L AD-652 712
8L AD-652 713
8L AD-652 714
8L AD-652 715
20L AD-652 716
7D AD-652 717
9A AD-652 718
7D AD-652 719
10C AD-652 720
20D AD-652 721
17E AD-652 722
20C AD-652 723
9B AD-652 724
13A AD-652 725
19D AD-652 726
20C AD-652 727
12B AD-652 728
9E AD-652 729
9B AD-652 730
5K AD-652 731
8F AD-652 732
11F AD-652 733
6C AD-652 734
5E AD-652 735
6E AD-652 736
5B AD-652 737
7D AD-652 738
7D AD-652 739
7D AD-652 740
20F AD-652 741
5B AD-652 742
8G AD-652 743
12A AD-652 744
20H AD-652 745
8G AD-652 746
7D AD-652 747
7D AD-652 748
20E AD-652 749
20H AD-652 750
3A AD-652 751
20B AD-652 752
3B AD-652 753
7E AD-652 754
20F AD-652 755
20C AD-652 756

3B AD-652 757
17B AD-652 758
4A AD-652 759
4A AD-652 760
8J AD-652 761
8N AD-652 762
8J AD-652 763
8G AD-652 764
8G AD-652 765
8G AD-652 766
3B AD-652 767
5I AD-652 768
8F AD-652 769
20L AD-652 770
7B AD-652 771
6E AD-652 772
8L AD-652 773
8L AD-652 774
8L AD-652 775
6E AD-652 776
3A AD-652 777
3A AD-652 778
4A AD-652 779
6E AD-652 780
6E AD-652 781
5C AD-652 782
6J AD-652 783
5J AD-652 784
6C AD-652 785
12A AD-652 786
6R AD-652 787
6E AD-652 788
6C AD-652 789
20I AD-652 790
6E AD-652 791
6R AD-652 792
20B AD-652 793
18F AD-652 794
9E AD-652 795
13J AD-652 796
12B AD-652 797
13M AD-652 798
13H AD-652 799
9E AD-652 800
20D AD-652 801
13M AD-652 802
17I AD-652 803
17G AD-652 804
20D AD-652 805
9F AD-652 806
8N AD-652 807
17B AD-652 808
13J AD-652 809
11D AD-652 810
6E AD-652 811
4B AD-652 812
5I AD-652 813
8C AD-652 814
19B AD-652 815
22C AD-652 816
14C AD-652 817
17I AD-652 818
12A AD-652 819
20D AD-652 820
5C AD-652 821
19A AD-652 822
7D AD-652 823
20D AD-652 824
17B AD-652 825
20H AD-652 826

20H AD-652 827
11B AD-652 828
11F AD-652 829
20F AD-652 830
13I AD-652 831
3B AD-652 832
12A AD-652 833
20L AD-652 834
9A AD-652 835
22B AD-652 836
20B AD-652 837
17B AD-652 838
20L AD-652 839
20H AD-652 840
17I AD-652 841
22B AD-652 842
11H AD-652 843
11I AD-652 844
21B AD-652 845
6T AD-652 846
12A AD-652 847
20F AD-652 848
6T AD-652 849
6T AD-652 850
6L AD-652 851
6F AD-652 852
6D AD-652 853
8K AD-652 854
4A AD-652 855
9B AD-652 856
17I AD-652 857
8N AD-652 858
8N AD-652 859
8N AD-652 860
8N AD-652 861
8N AD-652 862
8N AD-652 863
8N AD-652 864
8N AD-652 865
13L AD-652 866
11C AD-652 867
14B AD-652 868
8L AD-652 869
8L AD-652 870
8M AD-652 871
8L AD-652 872
6R AD-652 873
6R AD-652 874
9E AD-652 875
14B AD-652 876
9A AD-652 877
17I AD-652 878
7D AD-652 879
6C AD-652 880
20K AD-652 881
8E AD-652 882
5B AD-652 883
13C AD-652 884
9A AD-652 885
4B AD-652 886
5J AD-652 887
8A AD-652 888
20D AD-652 889
6C AD-652 890
9A AD-652 891
6U AD-652 892
6U AD-652 893
20I AD-652 894
14B AD-652 895
21E AD-652 896

7B AD-652 897
6P AD-652 898
5G AD-652 899
5G AD-652 900
12A AD-652 901
5G AD-652 902
20C AD-652 903
20C AD-652 904
20D AD-652 905
17B AD-652 906
9A AD-652 907
17B AD-652 908
6P AD-652 909
6H AD-652 910
6H AD-652 911
11F AD-652 912
20F AD-652 913
3A AD-652 914
8K AD-652 915
12A AD-652 916
19D AD-652 917
21D AD-652 918
17G AD-652 919
20D AD-652 920
12A AD-652 921
12A AD-652 922
11H AD-652 923
11H AD-652 924
1A AD-652 925
1C AD-652 926
1C AD-652 927
20C AD-652 928
7D AD-652 929
20I AD-652 930
1C AD-652 931
12A AD-652 932
7D AD-652 933
13I AD-652 934
20A AD-652 935
6E AD-652 936
6P AD-652 937
17I AD-652 938
17G AD-652 939
6A AD-652 940
6R AD-652 941
6E AD-652 942
1B AD-652 943
1B AD-652 944
6E AD-652 945
6E AD-652 946
11F AD-652 947
5J AD-652 948
3B AD-652 949
4A AD-652 950
3B AD-652 951
9E AD-652 952
9E AD-652 953
8A AD-652 954
7D AD-652 955
20L AD-652 956
7D AD-652 957
7D AD-652 958
12A AD-652 959
7D AD-652 960
20K AD-652 961
20L AD-652 962
7D AD-652 963
12A AD-652 964
12A AD-652 965
7D AD-652 966
7D AD-652 967
20M AD-652 968
4A AD-652 969
12A AD-652 970
8K AD-652 971
20A AD-652 972
8K AD-652 973
12A AD-652 974
20J AD-652 975
20H AD-652 976
5I AD-652 977
7B AD-652 978
20J AD-652 979
17I AD-652 980
13J AD-652 981
9B AD-652 982
12A AD-652 983
20C AD-652 984
5J AD-652 985
5B AD-652 986
12A AD-652 987
12A AD-652 988
20I AD-652 989
20C AD-652 990
12A AD-652 991
7D AD-652 992
20C AD-652 993
7D AD-652 994
20D AD-652 995
1A AD-652 996
1C AD-652 997
1C AD-652 998
5J AD-652 999
12A AD-653 000
4A AD-653 001
12A AD-653 002
4A AD-653 003
4A AD-653 004
20A AD-653 005
4A AD-653 006
11F AD-653 007
12B AD-653 008
9E AD-653 009
9E AD-653 010
9E AD-653 011
12A AD-653 012
12A AD-653 013
17I AD-653 014
20D AD-653 015
4B AD-653 016
4A AD-653 017
13M AD-653 018
13M AD-653 019
13M AD-653 020
6U AD-653 021
6U AD-653 022
6U AD-653 023
6U AD-653 024
8E AD-653 025
20D AD-653 026
19A AD-653 027
8K AD-653 028
19A AD-653 029
7E AD-653 030
20E AD-653 031
20C AD-653 032
8J AD-653 033
8J AD-653 034
6E AD-653 035
6A AD-653 036
18D AD-653 037
8G AD-653 038
8A AD-653 039
8C AD-653 040
8L AD-653 041
17I AD-653 042
8H AD-653 043
8H AD-653 044
7C AD-653 045
20E AD-653 046
20J AD-653 047
3A AD-653 048
3A AD-653 049
3B AD-653 050
7D AD-653 051
3B AD-653 052
22C AD-653 053
20I AD-653 054
20L AD-653 055
9E AD-653 056
20I AD-653 057
20L AD-653 058
20F AD-653 059
20E AD-653 060
7D AD-653 061
11C AD-653 062
6R AD-653 063
6R AD-653 064
4A AD-653 065
21D AD-653 066
6C AD-653 067
20K AD-653 068
20E AD-653 069
12A AD-653 070
12A AD-653 071
12A AD-653 072
20K AD-653 073
5J AD-653 074
13J AD-653 075
18H AD-653 076
5B AD-653 077
3C AD-653 078
18F AD-653 079
11F AD-653 080
21B AD-653 081
13J AD-653 082
14E AD-653 083
14E AD-653 084
17G AD-653 085
5C AD-653 086
5C AD-653 087
20L AD-653 088
20D AD-653 089
7E AD-653 090
20F AD-653 091
8H AD-653 092
1C AD-653 093
14B AD-653 094
20I AD-653 095
9E AD-653 096
20D AD-653 097
9E AD-653 098
5J AD-653 099
5J AD-653 100
6E AD-653 101
8J AD-653 102
12B AD-653 103
12B AD-653 104
15C AD-653 105
7D AD-653 106
20L AD-653 107
12A AD-653 108
7C AD-653 109
14E AD-653 110
20D AD-653 111
20D AD-653 112
13L AD-653 113
20K AD-653 114
20K AD-653 115
5J AD-653 116
12A AD-653 117
5J AD-653 118
5J AD-653 119
5J AD-653 120
20D AD-653 121
20I AD-653 122
20A AD-653 123
9D AD-653 124
6L AD-653 125
9F AD-653 126
6C AD-653 127
5I AD-653 128
6U AD-653 129
18C AD-653 130
6U AD-653 131
7D AD-653 132
8L AD-653 133
8L AD-653 134
8L AD-653 135
8L AD-653 136
8L AD-653 137
8L AD-653 138
20E AD-653 139
12A AD-653 140
8L AD-653 141
9B AD-653 142
8L AD-653 143
20K AD-653 144
4B AD-653 145
20D AD-653 146
15G AD-653 147
11F AD-653 148
6P AD-653 149
8L AD-653 150
19D AD-653 151
16B AD-653 152
11G AD-653 153
9E AD-653 154
9E AD-653 155
11F AD-653 156
9E AD-653 157
9B AD-653 158
89E AD-653 159
4A AD-653 160
6M AD-653 161
20K AD-653 162
7B AD-653 163
84A AD-653 164
9E AD-653 165
4B AD-653 166
4A AD-653 167
4A AD-653 168
4A AD-653 169
4A AD-653 170
4B AD-653 171
4A AD-653 172
4A AD-653 173
12B AD-653 174
5D AD-653 175
5K AD-653 176
5C AD-653 177
12B AD-653 178
13M AD-653 179
13M AD-653 180
20D AD-653 181
20A AD-653 182
7B AD-653 183
10B AD-653 184
18H AD-653 185
8K AD-653 186
4B AD-653 187
21D AD-653 188
12A AD-653 189
9A AD-653 190
9B AD-653 191
6P AD-653 192
8E AD-653 193
8E AD-653 194
4A AD-653 195
20H AD-653 196
7D AD-653 197
8G AD-653 198
20D AD-653 199
17H AD-653 200
20L AD-653 201
20L AD-653 202
4A AD-653 203
20L AD-653 204
20L AD-653 205
20D AD-653 206
6D AD-653 207
3A AD-653 208

5J AD-653 209
20F AD-653 210
3A AD-653 211
9E AD-653 212
20E AD-653 213
7E AD-653 214
9C AD-653 215
20I AD-653 216
18D AD-653 217
20E AD-653 218
13G AD-653 219
20D AD-653 220
6P AD-653 221
9A AD-653 222
8K AD-653 223
12A AD-653 224
9E AD-653 225
12A AD-653 226
20D AD-653 227
7D AD-653 228
6E AD-653 229
6A AD-653 230
7C AD-653 231
12A AD-653 232
21B AD-653 233
7C AD-653 234
12A AD-653 235
6R AD-653 236
20M AD-653 237
7D AD-653 238
7E AD-653 239
3B AD-653 240
6P AD-653 241
20M AD-653 242
18C AD-653 243
20F AD-653 244
12A AD-653 245
7D AD-653 246
3B AD-653 247
20L AD-653 248
7B AD-653 249
21B AD-653 250
20D AD-653 251
20M AD-653 252
20I AD-653 253
5B AD-653 254
12A AD-653 255
7D AD-653 256
20E AD-653 257
9B AD-653 258
7C AD-653 259
3B AD-653 260
3B AD-653 261
5G AD-653 262
5G AD-653 263
12B AD-653 264
12A AD-653 265
12B AD-653 266
12A AD-653 267
8C AD-653 268
4B AD-653 269
8J AD-653 270
12A AD-653 271
12A AD-653 272
12B AD-653 273
6R AD-653 274
6R AD-653 275
6R AD-653 276
5J AD-653 277
17A AD-653 278
5B AD-653 279
5B AD-653 280
20K AD-653 281
11F AD-653 282
12A AD-653 283
13J AD-653 284
14B AD-653 285
8J AD-653 286
9E AD-653 287
6R AD-653 288
20K AD-653 289
5J AD-653 290
13J AD-653 291
17G AD-653 292
13A AD-653 293
20A AD-653 294
13L AD-653 295
20D AD-653 296
12A AD-653 297
12A AD-653 298
7D AD-653 299
7D AD-653 300
20K AD-653 301
9A AD-653 302
20B AD-653 303
7D AD-653 304
9E AD-653 305
9D AD-653 306
7D AD-653 307
12A AD-653 308
20H AD-653 309
20K AD-653 310
12A AD-653 311
20K AD-653 312
7D AD-653 313
7D AD-653 314
12A AD-653 315
12A AD-653 316
8E AD-653 317
12A AD-653 318
9F AD-653 319
20J AD-653 320
20J AD-653 321
20J AD-653 322
8K AD-653 323
20H AD-653 324
20D AD-653 325
20K AD-653 326
12A AD-653 327
5J AD-653 328
20I AD-653 329
9E AD-653 330
8G AD-653 331
20B AD-653 332
20L AD-653 333
20E AD-653 334
7B AD-653 335
20B AD-653 336
20E AD-653 337
20I AD-653 338
20H AD-653 339
20B AD-653 340
9A AD-653 341
20L AD-653 342
20E AD-653 343
20E AD-653 344
9A AD-653 345
11B AD-653 346
18G AD-653 347
20N AD-653 348
9A AD-653 349
7D AD-653 350
7D AD-653 351
3B AD-653 352
7D AD-653 353
18D AD-653 354
4A AD-653 355
12A AD-653 356
9A AD-653 357
5J AD-653 358
20I AD-653 359
3A AD-653 360
13H AD-653 361
20F AD-653 362
20L AD-653 363
20E AD-653 364
17E AD-653 365
20I AD-653 366
20E AD-653 367
11F AD-653 368
20M AD-653 369
8A AD-653 370
8J AD-653 371
20E AD-653 372
17B AD-653 373
20I AD-653 374
20J AD-653 375
20D AD-653 376
9D AD-653 377
20J AD-653 378
11F AD-653 379
12A AD-653 380
7E AD-653 381
20M AD-653 382
12A AD-653 383
20D AD-653 384
8M AD-653 385
20L AD-653 386
6A AD-653 387
6M AD-653 388
7D AD-653 389
12A AD-653 390
7A AD-653 391
7D AD-653 392
12A AD-653 393
7D AD-653 394
3B AD-653 395
20L AD-653 396
20C AD-653 397
7C AD-653 398
7D AD-653 399
11D AD-801 547
12A AD-802 564
20N AD-803 393
7E AD-806 625
9B AD-806 959
11B AD-811 146
6R AEC-TR-6771
18B AGN-8163-VOL-1
18D AI-CE-35
18I ANL-6841
18I ANL-7168 VOL. I
7E ANL-7199
18I ANL-7202
20B ANL-7237
18I ANL-7263
18I ANL-7302
18I BMI-1778
18I BMI-1779
18J BMI-1791
6F BNL-50001
6A BNL-989
9B BNWL-299
18I BNWL-308
18H BNWL-330
18D BNWL-337
6R BNWL-339
18G BNWL-373
11F BNWL-378
6R CEX-62.12
18D CONF-660511
6H COO-1283-40
7B DP-1065
6R GAT-520
6R HASL-179
18D IDO-14679
18I IDO-17205
18M IDO-17210
18I IDO-17212
18J IN-1069
20H IS-1448
9B K-1641
18H K-1686
7D K-1689
18D K-1692
20H K-1693
7A LA-3534
20M LA-3543
11G LA-3569-MS
6M LA-3638
18J LA-3654
18A MATT-Q-23
18J MCW-1506
18J MCW-1507
7A MCW-1509
20H MLM-1251
21F NAA-SR-11935
14B NBS MISC PUB-286
13D NBS-MISC-PUB-290
18B NYO-2983-1
6H NYO-3666-1
20I N67-12800
20K N67-12909
22A N67-12981
13I N67-13011
20L N67-13103
9F N67-15456
9F N67-15551
22B N67-15669
20H N67-15686
9F N67-15899
6A N67-26485
20F N67-26488
20I N67-26501
20I N67-26502
6S N67-26503
21H N67-26505
8G N67-26506
3B N67-26507
13H N67-26508
5B N67-26510
3B N67-26511
3A N67-26513
14B N67-26514
20E N67-26515
10A N67-26516
13I N67-26518
9B N67-26519
9A N67-26520
22C N67-26521
9B N67-26541
6K N67-26542
13I N67-26543
21B N67-26544
1C N67-26545
22D N67-26546
22D N67-26547
1D N67-26548
20L N67-26549
18K N67-26550
22A N67-26551
20M N67-26552
20D N67-26553
20J N67-26554
20K N67-26555
12A N67-26556
18N N67-26557
1A N67-26558
6R N67-26561
20I N67-26562
20I N67-26563
6K N67-26567
10A N67-26568
20M N67-26572
6C N67-26573
6S N67-26574
6K N67-26575
6S N67-26576
6L N67-26578
22B N67-26581
10A N67-26582
20D N67-26584

22B N67-26585
9B N67-26586
9B N67-26587
6L N67-26588
22D N67-26591
22B N67-26592
22B N67-26593
20I N67-26597
20J N67-26598
5H N67-26599
22B N67-26600
7D N67-26616
20N N67-26621
20L N67-26622
6S N67-26624
9F N67-26625
5H N67-26626
22C N67-26627
7D N67-26628
18I N67-26629
6O N67-26632
11F N67-26634
22A N67-26635
1A N67-26637
11F N67-26638
22A N67-26639
21C N67-26640
11F N67-26676
17B N67-26784
3B N67-26785
9A N67-26788
11I N67-26801
9B N67-26806
17B N67-26807
9A N67-26870
20I N67-26878
22A N67-26976
3B N67-27012
20F N67-27053
9C N67-27081
4B N67-27108
18H N67-27120
20K N67-27127
20E N67-27128
18D N67-27129
21I N67-27130
20J N67-27133
20H N67-27134
6A N67-27135
18I N67-27137
18J N67-27138
7D N67-27139
7D N67-27140
8L N67-27141
22C N67-27174
1A N67-27196
1A N67-27199
20I N67-27200
11I N67-27217
14B N67-27222
20M N67-27223
21H N67-27224
20H N67-27225
11F N67-27226
21B N67-27227
11I N67-27228
22C N67-27229
7D N67-27231
21H N67-27232
11F N67-27236
13A N67-27237
21H N67-27238
22A N67-27239
18I N67-27247
20L N67-27250
20H N67-27253
13H N67-27257
18J N67-27258
18J N67-27259
17B N67-27260
3B N67-27261
10A N67-27262
10C N67-27263
12A N67-27264
21H N67-27265
5H N67-27266
9F N67-27267
1A N67-27268
13G N67-27269
20K N67-27270
1C N67-27271
14B N67-27272
9A N67-27273
8B N67-27274
9B N67-27275
20H N67-27276
3C N67-27277
3C N67-27278
3C N67-27279
1D N67-27280
9F N67-27283
3B N67-27285
21H N67-27286
22B N67-27287
22B N67-27288
4B N67-27289
20K N67-27290
17H N67-27291
9F N67-27292
14E N67-27293
1B N67-27294
5B N67-27296
3B N67-27297
6S N67-27298
1B N67-27299
1A N67-27300
21E N67-27301
11E N67-27302
14B N67-27303
11F N67-27305
22A N67-27308
13H N67-27319
18K N67-27320
20G N67-27321
18D N67-27340
20H N67-27341
18D N67-27343
18B N67-27344
18G N67-27345
20I N67-27362
20D N67-27363
9A N67-27365
9F N67-27366
9E N67-27368
1A N67-27369
3B N67-27370
13H N67-27371
6A N67-27373
20B N67-27374
3B N67-27376
12A N67-27377
9F N67-27401
22D N67-27415
7C N67-27417
11F N67-27420
11D N67-27421
3B N67-27422
12A N67-27423
3B N67-27424
20L N67-27425
9E N67-27427
7C N67-27428
13H N67-27429
11F N67-27430
7D N67-27431
11D N67-27434
6E N67-27435
20L N67-27437
7D N67-27439
22D N67-27440
18J N67-27457
9A N67-27473
20I N67-27496
18I N67-27500
13E N67-27501
13G N67-27502
7B N67-27504
11F N67-27506
5J N67-27507
13H N67-27508
13I N67-27509
13I N67-27510
11F N67-27531
20I N67-27532
14B N67-27533
20K N67-27534
13M N67-27535
20D N67-27536
7D N67-27537
9B N67-27543
20C N67-27544
7D N67-27546
18E N67-27551
20D N67-27552
20H N67427554
20H N67-27561
9B N67-27562
4A N67-27563
20H N67-27565
14A N67-27566
7D N67-27567
20K N67-27569
1A N67-27572
1A N67-27573
8G N67-27574
20K N67-27610
20M N67-27612
9A N67-27613
9F N67-27614
18F N67-27615
1A N67-27616
1B N67-27617
9C N67-27619
22A N67-27620
14B N67-27621
6C N67-27626
8J N67-27631
17B N67-27635
10C N67-27639
22C N67-27642
9B N67-27643
12A N67-27644
12A N67-27645
4A N67-27646
3B N67-27647
4A N67-27648
9A N67-27649
13H N67-27650
10A N67-27666
20M N67-27667
20M N67-27668
20E N67-27669
9C N67-27670
9C N67-27671
12A N67-27672
1A N67-27673
6M N67-27674
12A N67-27675
20H N67-27683
9B N67-27689
4B N67-27692
6P N67-27698
9C N67-27699
11F N67-27701
1A N67-27702
7B N67-27703
22B N67-27704
6A N67-27707
20I N67-27709
12A N67-27711
22A N67-27741
13H N67-27751
20K N67-27766
1A N67-27770
5J N67-27773
20D N67-27775
9B N67-27776
10A N67-27779
3B N67-27780
18I ORNL-4015
18D ORNL-4019
6- ORNL-4064
7A ORNL-4088
18F ORNL-4093
12A ORNL-4099
2- ORO-653
20D PB-173 464
13M PB-173 481
13M PB-173 583
9B PB-173 586
13M PB-173 590
5J PB-173 592
9C PB-173 593
20D PB-173 596
15E PB-173 600
6M PB-173 604
21C PB-173 639
13F PB-173 646
13F PB-173 650
13F PB-173 665
13F PB-173 666
4B PB-173 683
6M PB-173 691
5C PB-173 729
13B PB-173 730
8M PB-173 763
22B PB-173 764
4A PB-173 777
13B PB-173 809
20N PB-173 811
4B PB-173 827
13L PB-173 859
13B PB-173 863
8M PB-173 924
8J PB-173 933
4B PB-173 934
20D PB-173 942
13B PB-173 958
1C PB-174 099
9E PB-174 195
4B PB-174 666
4B PB-174 667
13B PB-174 705
13B PB-174 706
13B PB-174 708
4B PB-174 709
5C PB-174 719
13L PB-174 722
13B PB-174 727
5B PB-174 737
14B PB-174 738
6O PB-174 743
13I PB-174 744
5C PB-174 745
13B PB-174 746
5C PB-174 752
20N PB-174 763
13B PB-174 774
5C PB-174 776
5C PB-174 777
5C PB-174 779
5C PB-174 780

5C	PB-174 781	13B	PB-174 805	13B	PB-174 825	18J	RFP-799
5C	PB-174 783	13B	PB-174 806	6E	PB-174 827	20G	SC-RR-66-506
5C	PB-174 784	13B	PB-174 807	17G	PB-174 828	6R	TID-3585
5C	PB-174 785	13B	PB-174 810	9C	PB-174 830	6R	UCLA-12-612
5C	PB-174 786	13B	PB-174 811	9C	PB-174 831	18C	UCRL-14729
5C	PB-174 788	13B	PB-174 812	9C	PB-174 832	18B	UCRL-16964
13F	PB-174 794	13B	PB-174 813	9C	PB-174 833	18D	UCRL-17317
13M	PB-174 795	13B	PB-174 814			6A	UCRL-50160
12A	PB-174 796			5C	PB-174 835	18H	UCRL-50163 PT. 1
4B	PB-174 797	13B	PB-174 815	5J	PB-174 837	18C	UCRL-50179
9C	PB-174 798	13B	PB-174 816	9C	PB-174 851	20H	UCRL-50181
20K	PB-174 799	13B	PB-174 817	9C	PB-174 853	7E	UCRL-50183
4B	PB-174 801	13B	PB-174 818	9C	PB-174 854	18I	WAPD-MRP-119
13B	PB-174 802	13B	PB-174 819	9C	PB-174 855	18H	WT-1488
13B	PB-174 803	13B	PB-174 820	9C	PB-174 856	13I	Y-1557
13B	PB-174 804	13B	PB-174 821	9C	PB-174 858	13I	Y-1565

INDEXES

For Subject, Personal Author, Corporate Author, Contract Number, and Accession/Report Number Indexes to the documents listed in this journal, see Government-Wide Index (67-15), 10 Aug 1967.

U. S. DEPARTMENT OF COMMERCE FIELD OFFICES
PROVIDE READY ACCESS TO COMMERCE SERVICES

• The Department of Commerce maintains Field Offices in the cities listed below for the purpose of providing ready access to the reports, publications, and services of the Business and Defense Services Administration, Bureau of International Commerce, Clearinghouse for Federal Scientific and Technical Information, Office of Business Economics, and the Bureau of the Census. Information on activities of the National Bureau of Standards, Patent Office, and the Area Redevelopment Administration is also available.

• Experienced personnel will gladly assist in the solution of specific problems, explain the scope and meaning of regulations administered by the Department, and provide practical assistance in the broad field of domestic and foreign commerce. Field offices act as official sales agents of the Superintendent of Documents and stock a wide range of official Government publications relating to business. Each office maintains an extensive business reference library containing periodicals, directories, publications, and reports from official as well as private sources.

Department Field Offices

Albuquerque, N. Mex., 87101, U.S. Courthouse. 247-0311.
Anchorage, Alaska, 99501, 306 Loussac-Sogn Building. Phone: 272-6331.
Atlanta, Ga., 30303, 75 Forsyth Street, N.W. 526-6000.
Baltimore, Md., 21202, 305 U.S. Customhouse, Gay and Lombard Streets. Phone: PLaza 2-8460.
Birmingham, Ala., 35205, Suite 200-201, 908 South 20th Street. Phone: 325-3327.
Boston, Mass., 02203. Rm. 510, John Fitzgerald Kennedy Federal Bldg., CApitol 3-2312.
Buffalo, N.Y., 14203, 504 Federal Building, 117 Ellicott Street. Phone: 842-3208.
Charleston, S.C., 29403, Federal Building, Suite 631, 334 Meeting Street. Phone: 747-4171.
Charleston, W. Va., 25301, 3002 New Federal Office Building, 500 Quarrier Street. Phone: 343-6196.
Cheyenne, Wyo., 82001, 6022 Federal Building, 2120 Capitol Avenue. Phone: 634-5920.
Chicago, Ill., 60604, 1486 New Federal Building, 219 South Dearborn Street. Phone: 828-4400.
Cincinnati, Ohio, 45202, 8028 Federal Office Building, 550 Main Street. Phone: 684-2944.
Cleveland, Ohio, 44101, 4th Floor, Federal Reserve Bank Bldg., East 6th St. & Superior Ave. Phone: 241-7900.
Dallas, Tex., 75202, Room 1200, 1114 Commerce Street. RIverside 9-3287.
Denver, Colo., 80202, 16407 Federal Building, 20th and Stout Street. Phone: 297-3246.
Des Moines, Iowa, 50309, 1216 Paramount Building, 509 Grand Avenue. Phone: 284-4222.
Detroit, Mich., 48226, 445 Federal Bldg. 226-6088.
Greensboro, N.C., 27402, 412 U.S. Post Office Building. Phone: 275-9111.
Hartford, Conn., 06103, 18 Asylum St. Phone: 244-3530.
Honolulu, Hawaii, 96813, 202 International Savings Bldg., 1022 Bethel Street. Phone: 588977.
Houston, Tex., 77002, 5102 Federal Bldg., 515 Rusk Ave. Phone: 228-0611.
Jacksonville, Fla., 32202, 512 Greenleaf Building, 208 Laura Street. Phone: 354-7111.
Kansas City, Mo., 64106, Room 2011, 911 Walnut Street. FRanklin 4-3141.
Los Angeles, Calif., 90015, Room 450, Western Pacific Building, 1031 S. Broadway. Phone: 688-2833.
Memphis, Tenn., 38103, 345 Federal Office Building, 167 North Main Street. Phone: 534-3214.
Miami, Fla., 33130, 928 Federal Office Bldg., 51 S.W. First Avenue. Phone: 350-5267
Milwaukee, Wis., 53203, Straus Bldg., 238 W. Wisconsin Avenue. Phone: BR 2-8600.
Minneapolis, Minn., 55401, 306 Federal Building, 110 South Fourth Street. Phone: 334-2133.
New Orleans, La., 70130, 909 Federal Office Building (South), 610 South Street. Phone: 527-6546.
New York, N.Y., 10001, 61st Fl., Empire State Bldg., 350 Fifth Avenue. LOngacre 3-3377.
Philadelphia, Pa., 19107, Jefferson Building, 1015 Chestnut Street. Phone: 597-2850.
Phoenix, Ariz., 85025, 5413 New Federal Building, 230 N. First Avenue. Phone: 261-3285.
Pittsburgh, Pa., 15222, Room 2201, Federal Building, 1000 Liberty Avenue. Phone: 644-2850.
Portland, Oreg., 97204, 217 Old U.S. Courthouse, 520 S. W. Morrison Street. Phone: 226-3361.
Reno, Nev., 89502, 2028 Federal Building, 300 Booth Street. Phone: 784-5203.
Richmond, Va., 23240, 2105 Federal Building, 400 North 8th Street. Phone: 649-3611.
St. Louis, Mo., 63103, 2511 Federal Building, 1520 Market Street. MAin 2-4243.
Salt Lake City, Utah, 84111, 3235 Federal Building, 125 South State Street. Phone: 524-5116.
San Francisco, Calif., 94102, Federal Building, Box 36013. 450 Golden Gate Avenue. Phone: 556-5864.
Santurce, Puerto Rico, 00907, Room 628, 605 Condado Avenue. Phone: 723-4640.
Savannah, Ga., 31402, 235 U.S. Courthouse and Post Office Bldg., 125-29 Bull Street. Phone: 232-4321.
Seattle, Wash., 98104, 809 Federal Office Bldg., 909 First Avenue. 583-5615.

FEDERAL REGIONAL TECHNICAL REPORT CENTERS

Each of the Federal Regional Technical Report Centers listed below contains a collection of USAEC, NASA, and DOD unclassified reports as well as reports of other U. S. Government agencies and provides reference, interlibrary loan, and reproduction services.

Carnegie Library of Pittsburgh
4400 Forbes St.
Pittsburgh, Pa. 15213

Columbia University
Engineering Library
Seeley W. Mudd Building
New York, N. Y. 10027

Georgia Institute of Technology
Price Gilbert Library
Atlanta, Ga. 30300

The John Crerar Library
35 West 33rd St.
Chicago, Ill. 60616

Library of Congress
Science and Technology Division
Washington, D. C. 20540

Linda Hall Library
5109 Cherry Street
Kansas City, Mo. 64100

Massachusetts Institute of Technology
M. I. T. Libraries
Cambridge, Mass. 02139

Southern Methodist University
Science Library
P. O. Box 1339
Dallas, Tex. 75222

University of California
General Library
Berkeley, Calif. 94704

University of Colorado
Boulder, Colo. 80301

University of Washington Library
Government Documents Center
Seattle, Wash. 98105

COSATI Subject Fields

1 AERONAUTICS

2 AGRICULTURE

3 ASTRONOMY AND ASTROPHYSICS

4 ATMOSPHERIC SCIENCES

5 BEHAVIORAL AND SOCIAL SCIENCES

6 BIOLOGICAL AND MEDICAL SCIENCES

7 CHEMISTRY

8 EARTH SCIENCES AND OCEANOGRAPHY

9 ELECTRONICS AND ELECTRICAL ENGINEERING

10 ENERGY CONVERSION (NON-PROPULSIVE)

11 MATERIALS

12 MATHEMATICAL SCIENCES

13 MECHANICAL, INDUSTRIAL, CIVIL, AND MARINE ENGINEERING

14 METHODS AND EQUIPMENT

15 MILITARY SCIENCES

16 MISSILE TECHNOLOGY

17 NAVIGATION, COMMUNICATIONS, DETECTION, AND COUNTERMEASURES

18 NUCLEAR SCIENCE AND TECHNOLOGY

19 ORDNANCE

20 PHYSICS

21 PROPULSION AND FUELS

22 SPACE TECHNOLOGY

POSTAGE AND FEES PAID
U.S. DEPARTMENT OF COMMERCE

U.S. DEPARTMENT OF COMMERCE
CLEARINGHOUSE FOR FEDERAL
SCIENTIFIC AND TECHNICAL INFORMATION
SPRINGFIELD, VA. 22151

OFFICIAL BUSINESS